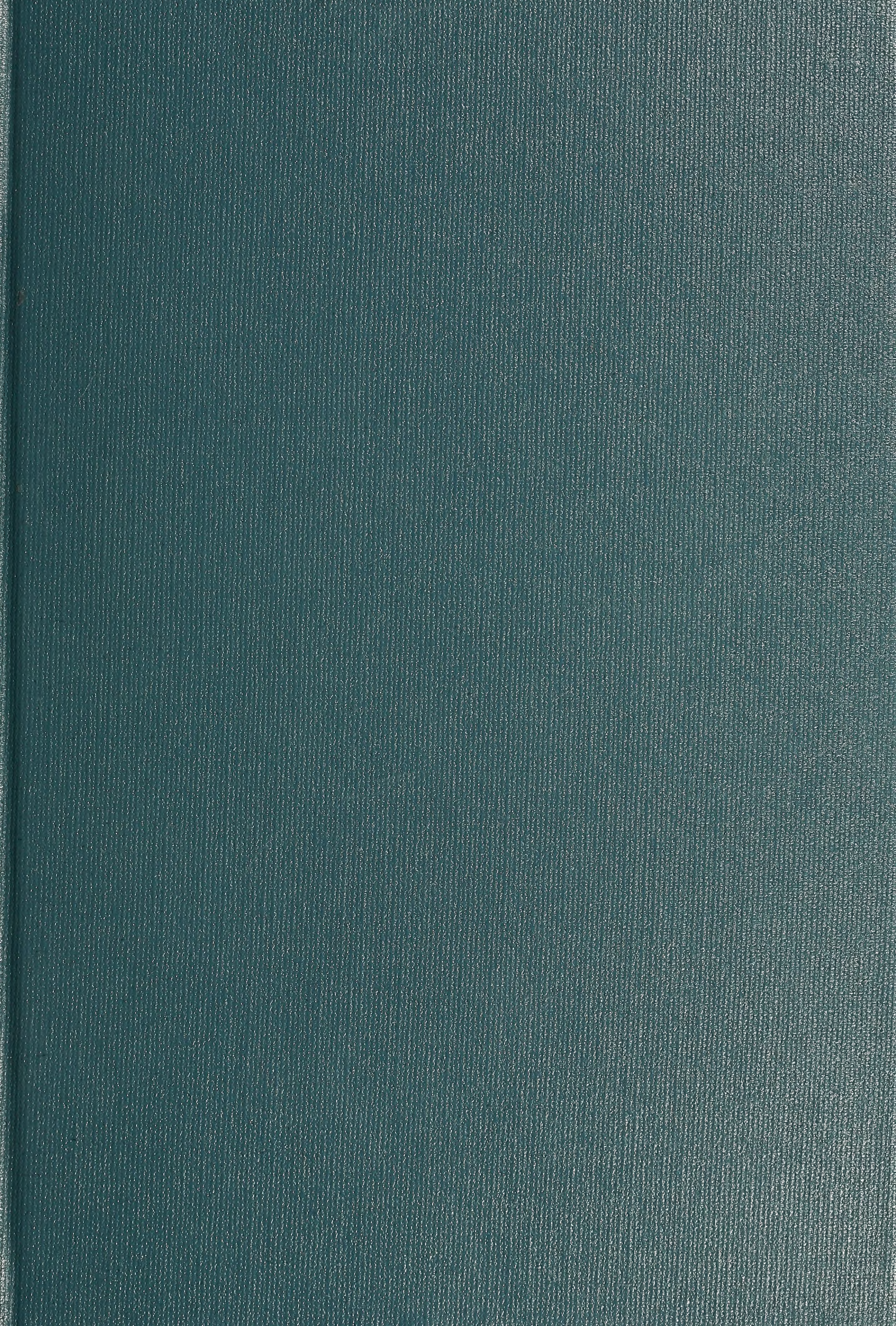
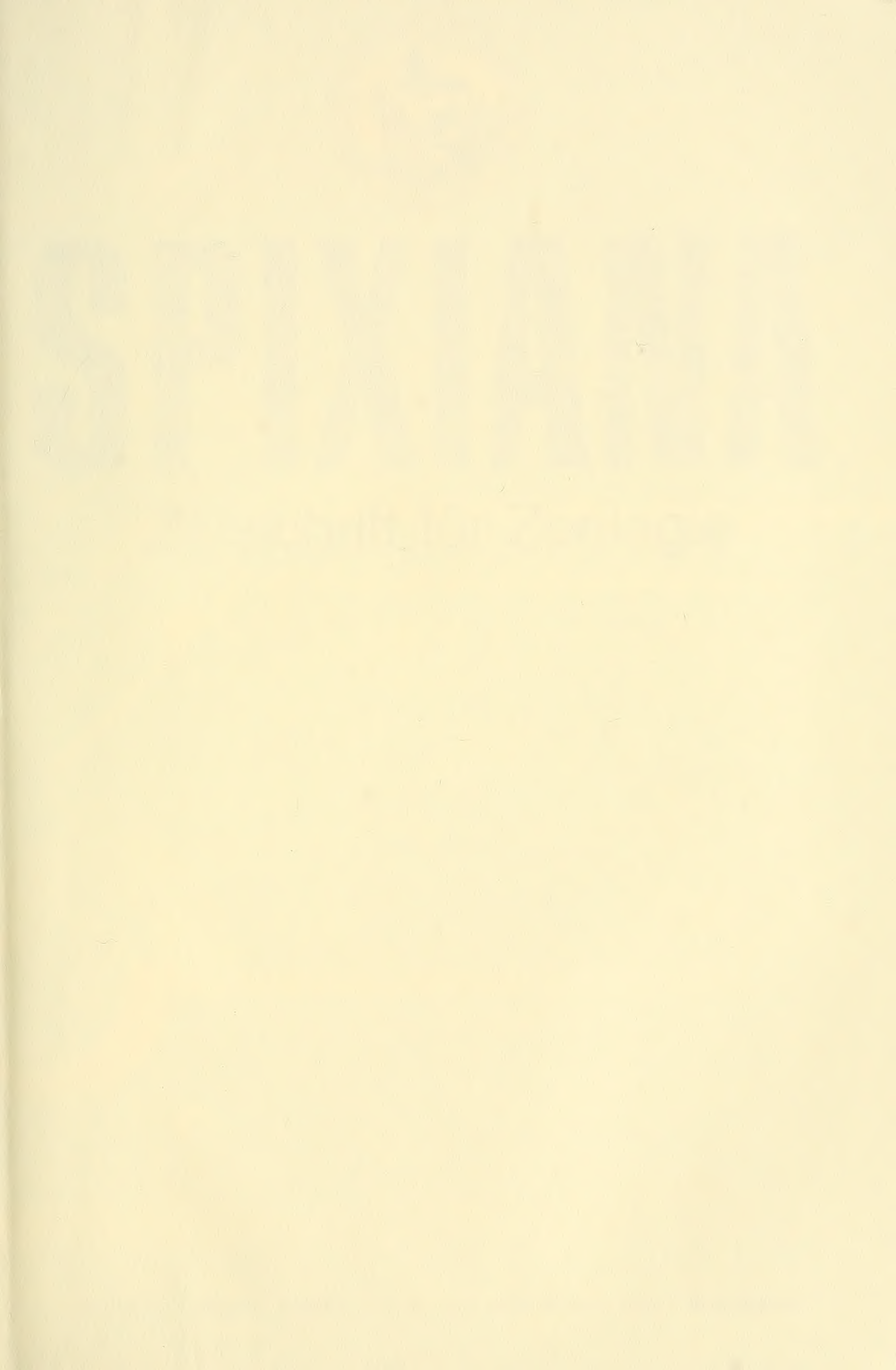








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SPIXIANA	**24**	1	1–4	München, 01. März 2001	ISSN 0341-8391

Umbellula monocephalus Pasternak, 1964, eine seltene Pennatularia aus dem südlichen Westeuropäischen Becken

(Anthozoa, Octocorallia, Pennatularia)

Ludwig Tiefenbacher

Tiefenbacher, L. (2001): *Umbellula monocephalus* Pasternak, 1964, a rare Pennatularia from the southern West European Basin (Anthozoa, Octocorallia, Pennatularia). – Spixiana **24/1:** 1-4

During cruise 198 of F.R.V."Walther Herwig III" in August/ September 1998 in the southern part of the West Europe Basin two specimens of *Umbellula monocephalus* Pasternak, 1964, this very rare pennatulacean octocoral of the abyssal, were collected. Only eight specimens of this deep-sea species are known till now.

Dr. Ludwig Tiefenbacher, Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München.

Einleitung

Die Pennatularia, zu deutsch Seefedern, sind hochspezialisierte sessile Anthozoa des Benthos, die über alle Ozeane vom Flachwasser bis zum Abyssal verbreitet sind. Sie sind angepaßt an das Leben auf Sediment wie Sanden und Schlick, in das sie mit ihrem Stiel teilweise eingebettet sind. Die Pennatularia bilden üblicherweise Tierstöcke mit mehreren bis vielen Polypen. Innerhalb der Familie Umbellulidae findet sich jedoch mit *Umbellula monocephalus* Pasternak, 1964, eine 'Ausnahme'. *Umbellula monocephalus* besitzt auf dünnem, hohen Stiel anscheinend nur einen einzigen großen Polypen.

Umbellula monocephalus Pasternak, 1964

Das der Originalbeschreibung von Pasternak zugrunde liegende Exemplar von *Umbellula monocephalus* wurde von F.S. "Vitjaz" auf der Expedition 1959-1961 im Indischen Ozean südlich von Sri Lanka ("Station 4911; 01°55'S/83°05'O") aus einer Tiefe von "4809-4794 m" gefangen. Von der gleichen Expedition, Station 4360 ("03°10'N/67°00'O; Tiefe 3490 m"), westlich der Malediven, führt Pasternak ein weiteres Exemplar an.

Broch beschreibt 1957 eine *Umbellula durissima* Kölliker, 1880, nördlich von NO-Brasilien, die von der Swedish Deep-Sea Expedition ("Station 357 (Haul No 6), 26.-27.07. 1948: N 02°26'/W 39°26' – N 02°24'/W 39°12'. Depth 4474-4430 m") eingebracht wurde. Er vermerkt für dieses Exemplar: " Only one specimen of this very characteristic species was brought home by the Swedish Atlantic expedition, and the specimen is defective, the lower part wanting, and, with its single autozooid it seems a little aberrant." Er erkannte also nicht, daß er eine noch unbekannte Art vor sich hatte, obwohl ihm das 'einzelne' Autozooid aufgefallen war.

Grasshoff (1972) erhielt von der "Meteor"- Expedition 19 unter anderen 3 Exemplare von Seefedern ("Ostatlantik, Horseshoe-Ebene; 33°46'N, 15°33'W; 3910-4002 m. "Meteor" – St. 19 – 191, Agassiz-Trawl 125, Hj. Thiel leg. 7.III.1970"), die ebenfalls nur ein 'einzelnes' Autozooid aufwiesen und die er als neue

Art *Umbellula thieli* beschrieb. Dieser Art fügte er das oben genannte, von Broch (1957) als *Umbellula durissima* Kölliker, 1880, beschriebene Exemplar als "Paratypoid" zu. Grasshoff kannte wohl den Titel der Arbeit von Pasternak (1964), doch war die Publikation für ihn damals nicht beschaffbar und aus dem Titel allein war die Beschreibung einer neuen Art nicht zu erschließen.

Anläßlich der Veröffentlichung der Ergebnisse der französischen BIOGAS-Expeditionen u.a. jedoch korrigiert Grasshoff (1981a,b) seinen Irrtum von 1972 und ordnet *Umbellula thieli* als Synonym *Umbellula monocephalus* zu und ebenso das von Broch als *Umbellula durissima* bezeichnete Exemplar. Aus dem Material der BIOGAS-Expedition IV kann Grasshof zwei weitere Exemplare von *Umbellula monocephalus* isolieren, von denen er das eine "mit ca. 25 cm Polypenlänge" als "das größte bisher gefundene" ("CP 17") bezeichnet und von dem zweiten ("CP 15") angibt, daß es nur wenig kleiner ist und sein Stiel mit ca. 52 cm Länge weitgehend erhalten ist. ["CP 15; Stn.4; 46°34'N, 10°26'W; 4715 m. CP 17, Stn.; 46°31'N / 10°19'W; 4706 m". Die Koordinaten wurden von mir aus der "Karte 17" (Grasshoff, 1981b) herausgemessen.].

Während der Expedition 198 mit F.F.S. "Walther Herwig III" konnten nun auf Station 50 (Hol 8) mit einem Agassiz-Trawl nach über 20 Jahren seit den letzten Nachweisen erstmals wieder zwei Exemplare dieser bisher außerordentlich selten gefundenen und offensichtlich ausschließlich auf das Abyssal als Lebensraum beschränkten Art erbeutet werden.

Material

Fangdaten: 08.09.1998; Fangzeit (Agassiz-Trawl am Boden!) 00.10-04.00 UTC; Koordinaten: Anfang: 46°02.69'N / 16°44.95'W → 45°55.75'N / 16°41.40'W; 4635,75 m → 4704.25 m. Bodenbeschaffenheit: Etwas verfestigter, blaugrauer Tiefseeton.

Die beiden Exemplare (Abb. 1A,B) wurden an Bord in 4%igem Formalin fixiert und an Land in 70 % Alkohol übergeführt. Die folgenden Maße wurden an den fixierten Tieren abgenommen. Die Stiele sind offensichtlich knapp über der Basis abgebrochen, da die vorhandenen Enden der Stiele einen etwas größeren Durchmesser aufweisen.

Exemplar A: Abbruchstelle des Stiels ∅ 2 mm; Mitte Stiel ∅ 1,5 mm; Stiel unter Polypenbasis ∅ 4 mm; Stiellänge von Bruchstelle bis Polypenbasis 153 mm; Länge der Rhachis (Polypenbasis bis Ende der Achse) 43 mm; Ende der Rhachis bis Tentakelspitze 40 mm; Übergang Rhachis – Tentakelkrone ∅ 16 mm.

Exemplar B: Abbruchstelle des Stiels ∅ 3 mm; Mitte Stiel ∅ 1,5 mm; Stiel unter Polypenbasis ∅ 6 mm; Stiellänge von Bruchstelle bis Polypenbasis 182 mm; Länge der Rhachis 64 mm; Ende der Rhachis bis Tentakelspitze 60 mm. Übergang Rhachis – Tentakelkrone ∅ 21 mm.

Die beiden Exemplare werden in der Zoologischen Staatssammlung, München, aufbewahrt.

Diskussion

Umbellula monocephalus gehört zu der Gruppe der Umbellulidae, die sich durch Sklerite in der Außenwand des Stiels, der Polypen und ihrer Tentakeln auszeichnen. Bei *Umbellula monocephalus* fällt dabei die Masse und die dichte Packung der Sklerite auf. Im Querschnitt sind die Sklerite rund. Die großen Sklerite der Tentakeln sind an einem, teilweise auch an beiden Enden etwas keulenförmig verdickt. Die ebenfalls langen, jedoch im Vergleich zu den genannten etwa um die Hälfte bis ein Drittel schlankeren Sklerite der Polypenwand sind spindelförmig. In gleicher Weise geformt, aber nur $^1/_5$ bis $^1/_{10}$ so lang sind die Sklerite an Stiel und Rhachis. Die Oberfläche der Sklerite erscheint bei stärkerer Vergrößerung genoppt. Pasternak (1964) und Grasshoff (1972) geben hierzu detaillierte Abbildungen.

Grasshoff (1972) sieht als Vorläufer von *Umbellula monocephalus* (= Synonym von *Umbellula thieli*) eine Art, die *Umbellula durissima* Kölliker, 1880 nahegestanden haben muß. "Die Größe der Polypen," ... "die runde Hornachse und die großen, runden Sklerite in den Wänden und Tentakeln" sprechen wohl dafür. "Unter Beibehaltung bzw. Verstärkung der genannten Eigenheiten kam es zu einer Vergrößerung" des Primärpolypen im Laufe der Evolution "und zur Reduzierung der übrigen Polypen." Grasshoff (1972) stellt für *U. thieli* die Frage: "Tierkolonie – Solitärer Organismus?" und vermerkt: "diese Seefeder erscheint als solitäres Wesen." Er erklärt jedoch weiter, daß der Primärpolyp, der "äußerlich nicht als solcher erkennbar", den Stiel, die Hornachse, den Autozooiden "und die

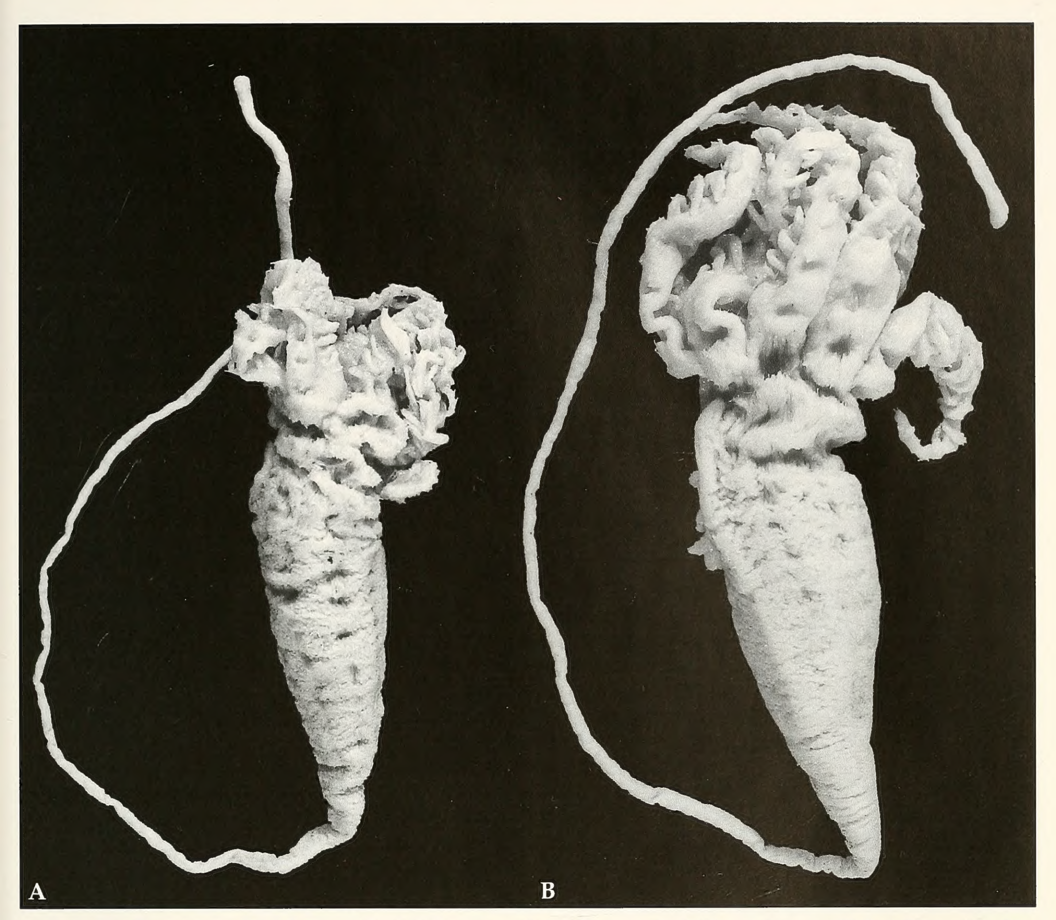


Abb. 1. Die Exemplare A und B von *Umbellula monocephalus* Pasternak, 1964 aus dem südlichen Westeuropäischen Becken. phot. M. Müller, Zoologische Staatssammlung, München.

unzähligen Siphonozooide" ... "in der Außernwand des Stiels und des großen Autozooiden produziert. Die Siphonozooide sind so stark reduziert, daß sie "nachgerade als Körperorgane des einen großen Polypen" erscheinen und damit "mit der typischen Gestalt eines Oktokorallen – Polypen kaum noch etwas gemein haben." Es ist "die Lebensform eines solitären Organismus" entstanden, aber eben nur das 'Erscheinungsbild' dessen.

Im gleichen Fang, aus dem die beiden Exemplare von *Umbellula monocephalus* stammen, fanden sich neben mehreren Holothuroidea und Asteroidea, die nicht näher bestimmt wurden, folgende Crustacea, Decapoda (Tiefenbacher, 2001): 1 Carapax von *Willemoesia leptodactyla* (Willemoes-Suhm, 1873), 1 Männchen von *Parapagurus abyssorum* (Filhol, 1885), 1 Männchen und 2 Weibchen von *Munidopsis crassa* Smith, 1885, das erste bekannt gewordene, eiertragende Weibchen von *Munidopsis parfaiti* (A. Milne-Edwards & Bouvier, 1894), 1 Männchen und 2 Weibchen von *Benthesicymus iridescens* Bate, 1881 und 1 Weibchen von *Plesiopenaeus armatus* (Bate, 1881). Die überwiegende Anzahl dieser Organismen sind Sedimentfresser. Das Gleiche ist auch wahrscheinlich für *Umbellula monocephalus*. Grasshoff (1972) ist ebenfalls dieser Ansicht.

Danksagung

Herrn Dr. M. Grasshoff, Natur-Museum und Forschungsinstitut Senckenberg, Frankfurt a.M., danke ich ganz herzlich für seine freundliche Hilfe bei der Beschaffung eines Teils der angegebenen Literatur und für das Entleihen seines Typenmaterials von *U. thieli*. In gleicher Weise gilt mein Dank Herrn Dr. Ted von Proschwitz, Naturhistoriska Museet, Göteborg, Schweden, für das Entleihen des von Broch (1957) als *U. durissima* beschriebenen Exemplars.

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Eine neue Heteronemertine von der Küste Japans

(Nemertini)

Wolfgang Senz

Senz, W. (2001): Eine neue Heteronemertine (Nemertini) von der Küste Japans. – Spixiana **24/1:** 5-13

Lineus nipponensis, spec. nov. from the coast of Japan is described and illustrated. Characters of special interest are: the mouth opening lies a short distance behind the brain; the preseptal outer longitudinal muscle layer includes a well-developed circular musculature; brain lies distal to the circular muscle layer of the body wall.

Dr. Wolfgang Senz, Zoologisches Institut, Universität Wien, Althanstraße 14, A-1090 Wien.

Einleitung

Die Nemertinenfauna der Küste Japans ist vor allem von U. Takakura, T. Yamaoka und F. Iwata erforscht worden. Wie für beinahe alle Meeresgebiete, so gilt auch für die Küste Japans, daß die Nemertinenfauna erst teilweise bekannt ist. In vorliegendem Aufsatz wird eine für die Wissenschaft neue Nemertinenart dieses Küstengebietes beschrieben.

Material und Methoden

Der Untersuchung liegen zwei Individuen zugrunde. Von dem Körpervorderende und Teilen des Mitteldarmbereichs jedes Tieres sind histologische Schnittserien hergestellt worden. Die Schnittserien (Einbettung in Paraplast, Schnittdicke: 10 μm) wurden in Haematoxylin-Eosin gefärbt. Das Material ist in der Naturhistorisches Museum Wien – Evertebrata Varia Sammlung (NHMW-EV) aufbewahrt. Es ist an der Küste Japans von dem Arzt v. Roretz gesammelt worden; Acquisitionsjahr (Naturhistorisches Museum Wien): 1881.

Lineus nipponensis spec. nov.
Abb. 1-9

Typen. Holotypus: NHMW-EV 17026/3990. – Paratypus: NHMW-EV 17027/3991.

Etymologie. Die Art ist nach dem Fundgebiet benannt.

Diagnose. Laterale Kopfspalten flach und nicht unmittelbar bis zu den Cerebralorganen reichend; äußere Längsmuskelschicht ohne Bindegewebeschicht; starke Ringmuskulatur in der äußeren Längsmuskelschicht des Preseptalbereiches; Ringmuskelschicht der Körperwand stark entwickelt; Mundöffnung signifikant hinter dem Gehirn liegend; Gehirn vollständig distal der Ringmuskelschicht der Körperwand positioniert; äußeres Neurilemma des Gehirns sehr gering entwickelt; Cerebralorgane lediglich mit ihren Hinterenden gegen die Seitengefäße vordringend; Ocellen fehlen; Rhynchodaeum

in zwei Abschnitte unterteilt; Rüssel aus vorderem Abschnitt und Hauptabschnitt bestehend; Rüsselepithel ohne rhabditoide Strukturen; Rüssel mit zwei Muskelkreuzen.

Beschreibung

Äußere Erscheinung. Die Körperlänge beträgt knapp 10 cm. Der Körper ist in der Vorderdarm- und der vordersten Mitteldarmregion weitgehend zylindrisch (Durchmesser: 2,8 mm); dahinter tritt eine deutliche Abflachung auf (Breite: 3,6 mm, Höhe: 1,4 mm). Seitliche Kanten des Körpers fehlen. Die Mundöffnung ist relativ groß. Ein Paar lateraler Kopfspalten ist ausgebildet. Sie sind flach und reichen von der Kopfspitze bis deutlich vor die Mundöffnung. Ein Caudalcirrus fehlt. Die fixierten Tiere sind von einheitlich gelblich-weißer Farbe.

Körperwand. Die Epidermis weist keine Besonderheiten auf. Die distale Basalmembran der äußeren Längsmuskelschicht ist an den histologischen Schnitten kaum erkennbar; die proximale Basalmembran ist geringfügig besser ausgebildet. Im Preseptalbereich weist die äußere Längsmuskelschicht eine kräftige Ringmuskulatur auf (Abb. 1, 3). Diese besteht in der Kopfspitze aus locker angeordneten, mehr oder weniger dorsoventral orientierten Fasern (Abb. 1), seitlich des Rhynchodaeums. Nach hinten zu entwickelt sich hieraus ein kompakter Muskelzylinder. Dieser liegt im distalen Drittel der äußeren Längsmuskelschicht. Im Bereich der proximalen Kopfspaltenden fächert die Ringmuskulatur teilweise auf, so daß einige Fasern ober- bzw. unterhalb der Kopfspalten distad ziehen (Abb. 1). Die Ringmuskulatur reicht bis in die Gehirnregion zurück. In ihrem Bereich befinden sich die meisten der insgesamt wenigen Dermaldrüsenzellen.

Im Vorderdarm- und vorderen Mitteldarmbereich ist die äußere Längsmuskelschicht knapp doppelt so dick wie die sehr gut entwickelte Ring- und die Längsmuskelschicht der Körperwand zusammen. In diesem Bereich dominieren im muskulären Teil der äußeren Längsmuskelschicht Längs- und Radiärmuskelfasern, wie auch radiär angeordnete Bindegewebestränge. Letztere sind in geringem Ausmaß miteinander verflochten. Im distalen Bereich der äußeren Längsmuskulatur tritt ein Komplex aus Bindegewebeelementen, Ringmuskelfasern und einigen Dermaldrüsen auf. Im Paratypus sind die Dermaldrüsen stellenweise signifikant zahlreicher ausgebildet als im Holotypus. Eine Bindegewebeschicht zwischen dem muskulären Teil der äußeren Längsmuskulatur und den Dermaldrüsen fehlt. Dorsoventrale Muskel- und Bindegewebefasern, wie sie zum Beispiel bei *Cerebratulus* Renier, 1804 auftreten, fehlen. Dies gilt für die gesamte äußere Längsmuskelschicht

Hinter dem vorderen Mitteldarmbereich wird die äußere Längsmuskulatur zusehends dünner, wobei sie vor allem ihre Radiärmuskulatur verliert, wie auch der proximale Gewebemantel stark reduziert wird.

Etwa auf halber Höhe des Preseptalbereiches, das Rhynchodaeum erfährt hier eine abrupte Einengung, tritt das Vorderende der Dorsalkommissur des Gefäßsystems auf. Zudem liegt hier das Vorderende des Zentralzylinders, in Form seines dorsalen Bogens (Abb. 1d). Dieser umwächst nach hinten zu die Dorsalkommissur und das Rhynchodaeum ventrad. Die Ringmuskulatur des Zentralzylinders ist in ihrem Ursprungsgebiet schwach entwickelt, dahinter stärker, wobei sie tangential in die äußere Längsmuskelschicht ausstrahlt. Die Längsmuskelschicht des Zentralzylinders bildet zunächst einen einheitlichen Mantel um Rhynchodaeum und Dorsalkommissur. Nach hinten zu wird dieser weitgehend in ein Paar dorsolaterale Pakete und ventrolaterale Teile differenziert (Abb. 3). Letztere sind nicht überall eindeutig gegenüber der Längsmuskulatur des Rhynchodaeums abgrenzbar. Die dorsomediane Verdrängung der Längsmuskulatur ist durch eine Erweiterung der Dorsalkommissur des Gefäßsystems bedingt. Im hinteren Drittel des Preseptalbereiches steigt das Rhynchodaeum innerhalb des Zentralzylinders in eine zentrale Position auf (Abb. 1f), die Dorsalkommissur beendend. Seitlich des Rhynchodaeums liegen somit die großen Seitengefäße. Der dieserart gegebene Komplex wird von der nun dünnen Längsmuskulatur des Zentralzylinders umgrenzt. Mediodorsal und -ventral fließt sie mit der Längsmuskulatur des Rhynchodaeums zusammen.

Die Längs- und die Ringmuskelschicht der Körperwand sind im Gehirnbereich relativ schwach entwickelt (Abb. 5). Dahinter, aber noch vor der Mundöffnung, gewinnen sie, abgesehen von ihren ventromedianen Teilen, an Dicke (Abb. 4). Mit dem Auftreten der Mundbucht wird der ventromediane Teil der Ringmuskelschicht zum Muskelbalken differenziert, wird also von der übrigen Muskelschicht abgetrennt. Deren blinde ventrolateralen Enden – wie auch jene der Längsmuskelschicht – umwachsen die Mundbucht ventrad, so daß hinter der Mundöffnung wieder ein geschlossener Muskelzylinder auftritt. Der Muskelbalken selbst ist median mit der ventralen Längsmuskelplatte verflochten und

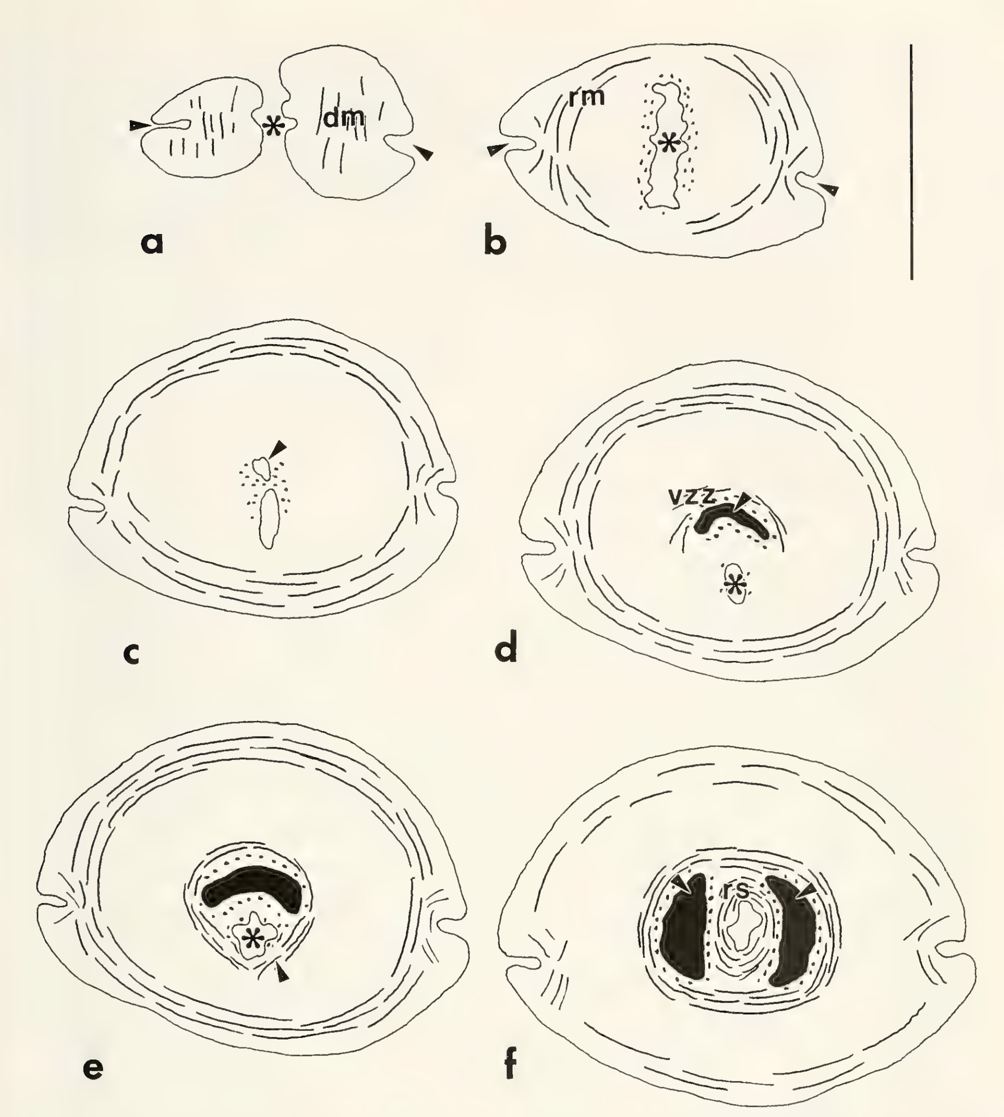


Abb. 1. *Lineus nipponensis,* spec. nov.: Darstellung einiger Organe des Preseptalbereiches (nach Zeichnungen mit dem Zeichenspiegel, schematisiert). **a** = 12. Schnitt (Stern: Rhynchodealöffnung; Pfeilspitzen: Kopfspalten), **b** = 20. (Stern = Rhynchodaeum; Pfeilspitzen: Kopfspalten), **c** = 35. (Pfeilspitze: mögliches Frontalorgan an der Hinterwand des vorderen Rhynchodaeum-Abschnittes), **d** = 40. (Stern = Rhynchodaeum; Pfeilspitze: Vorderende der Dorsalkommissur des Gefäßsystems), **e** = 46. (Stern = Rhynchodaeum; Pfeilspitze: ventraler Zusammenschluß des Zentralzylinders) (vgl. Abb. 3), **f** = 90. (Pfeilspitzen: Seitengefäße); Maßstab: 1 mm; Abkürzungen: dm = dorsoventral orientierte Muskelfasern (Ursprung der Ringmuskulatur der äußeren Längsmuskelschicht), rm = Ringmuskulatur der äußeren Längsmuskelschicht, rs = Rhynchodealsphinkter, vzz = Vorderende des Zentralzylinders (dorsaler Bogen).

kann bis in den Vorderdarmbereich zurück verfolgt werden. Seitlich bildet der Balken Muskelfahnen aus, das Vorderende der Vorderdarm-Radiärmuskulatur.

Von der inneren Ringmuskelschicht sind in geringem Umfang Horizontal- und Dorsoventralmuskeln des Gehirnbereichs, sowie Dorsoventralmuskeln des Mitteldarmbereichs (Abb. 8, 9) ausgebildet. Letztere formen zwischen den Seitentaschen des Mitteldarms teilweise gut entwickelte Muskelblätter aus.

Die ventrale Längsmuskelplatte nimmt ihren Ursprung von jenen Längsmuskelfasern der Körperwand-Längsmuskelschicht, die zwischen den Seitengefäßen und dem Vorderende des Rhynchocoels liegen (Abb. 4). Im Vorderdarmbereich gehen die Seitenränder der Muskelplatte kontinuierlich in die Vorderdarm-Längsmuskulatur über. Im Vorderdarm- und vorderen Mitteldarmbereich ist die Muskelplatte gut entwickelt. Dahinter sind ihre Seitenteile stark reduziert.

Zentralraum und Mesenchym. Im Vorderdarmbereich treten aufgrund des Vorderdarm-Gefäßnetzes einfache Leisten auf (Abb. 7). Im Mitteldarmbereich sind in Zusammenhang mit den Seitentaschen des Mitteldarms gut entwickelte Leisten ausgebildet (Abb. 8). Trotz der offenen Zentralraum-Organisation fehlt Mesenchym in nennenswerten Kontingenten weitestgehend.

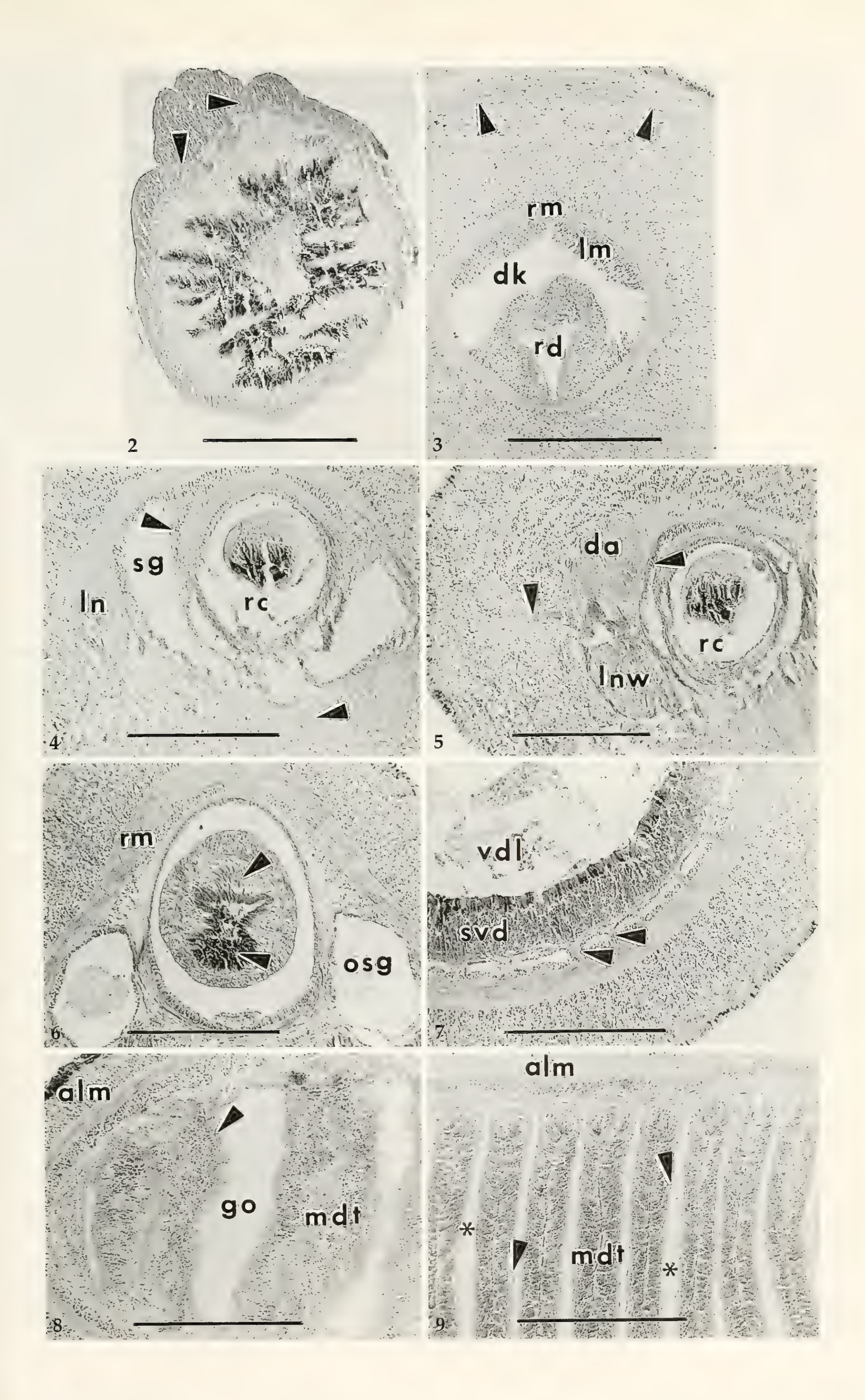
Darmtrakt. Die Mundöffnung liegt deutlich hinter dem Gehirn. Die Distanz zum Gehirn ist aber wesentlich kürzer als jene vom Gehirn zum Körpervorderende. Die Mundöffnung ist relativ groß. Die Wand der Mundbucht ist drüsenreich und geringfügig in Falten gelegt. Der Mundbucht schließt der gerade nach hinten ziehende Vorderdarm an. Dessen Wand, sie weist kaum Faltenbildung auf, besitzt subepitheliale Drüsen (Abb. 7). Die Vorderdarm-Muskulatur besteht aus Ring-, Längs- und Radiärmuskulatur (Abb. 7). Die Radiärmuskeln sind zumeist kräftig. Der Vorderdarmwand liegt die Ringmuskulatur an, der die Längsmuskulatur folgt. Letztere bildet eine fast vollständige Ummantelung der ventralen und lateralen Vorderdarmwand. Da diese Muskulatur beinahe kontinuierlich in die Seitenränder der ventralen Längsmuskelplatte übergeht, ist der Vorderdarm allseits von Längsmuskulatur umgeben.

Der Übergang in den Mitteldarm erfolgt kontinuierlich. Abgesehen von seinem vordersten Bereich weist der Mitteldarm relativ tiefe, geringfügig in Falten gelegte Seitentaschen auf (Abb. 8, 9). Sie sind tiefer, als das Zentralrohr des Mitteldarms breit ist.

Rüsselapparat. An der Kopfspitze liegt eine große Öffnung (Abb. 1a), an die ein depresser, waagerecht nach hinten ziehender Kanal anschließt (Abb. 1b). Dieser besitzt ein relativ dünnes Epithel. Etwa in der Mitte des Preseptalbereiches erfährt der Kanal eine abrupte Einengung auf seinen ventralen Bereich (Abb. 1c). Die hierdurch gegebene Rückwand des Kanales bildet Falten aus, die möglicherweise ein Frontalorgan beinhalten (Abb. 1c). Die Fortsetzung des Kanals ist zunächst ein wesentlich dünneres Rohr (Abb. 1d, e), das sich caudad dorsad erweitert (Abb. 1f). Letztlich reicht es (im Querschnitt) bis zum mediodorsalen Teil des Zentralzylinders. Dieserart erstreckt es sich bis zum Septum. Der gesamte Kanal – von der Körperspitze bis zum Septum – ist das Rhynchodaeum (vgl. unten). Das Epithel des vorderen Rhynchodaeum-Abschnittes – also jenem vor dem Zentralzylinder – ist deutlich dünner als jenes des hinteren Abschnittes. Zudem ist der hintere Rhynchodaeum-Abschnitt im Querschnitt nicht depress geformt. Beide Übergänge erfolgen aber kontinuierlich. Dem vorderen Rhynchodaeum-Abschnitt liegen Längsmuskelfasern an. Der dorsale Teil dieser Muskulatur fließt in das Vorderende der Längsmuskelschicht des Zentralzylinders ein. Dieser befindet sich dorsal des Vorderendes der Dorsalkommissur des Gefäßsystems. Eine kontinuierliche Verbindung mit der Längsmuskulatur des hinteren Rhynchodaeum-Abschnittes ist nicht feststellbar. Ventral liegen dem Vorderende der Dorsalkommis-

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Abb. 2-9. *Lineus nipponensis*, spec. nov. **2.** Querschnitt durch den Hauptabschnitt des Rüssels; Maßstab: 0,4 mm; Pfeilspitzen: Arme des stärker entwickelten Muskelkreuzes. **3.** Querschnitt auf Höhe des Vorderendes des hinteren Rhynchodaeum-Abschnittes (entspricht in etwa Abb. 1e); Maßstab: 0,3 mm; Pfeilspitzen: Ringmuskulatur der äußeren Längsmuskelschicht. **4.** Querschnitt durch den Bereich zwischen Gehirn und Mundbucht; Maßstab: 0,4 mm; obere Pfeilspitze: Ursprung der ventralen Längsmuskelplatte; untere Pfeilspitze: Vorderdarmnerv. **5.** Querschnitt durch den Cerebralorgankanal-Bereich; Maßstab: 0,4 mm; senkrechte Pfeilspitze: Cerebralorgankanal; waagerechte Pfeilspitze: Körperwandmuskulatur proximal des dorsalen Nervenpols. **6.** Querschnitt durch den Mundbuchtbereich; Maßstab: 0,4 mm; obere Pfeilspitze: Rüsselsektor mit den grob granulierte Sekretgranula enthaltenden Drüsen; untere Pfeilspitze: Rüsselsektor mit den blau färbbares Sekret enthaltenden Drüsenzellen. **7.** Querschnitt durch den Vorderdarmbereich; Maßstab: 0,4 mm; Pfeilspitzen: Radiärmuskeln der Vorderdarm-Muskulatur. **8.** Querschnitt durch die Mitteldarmregion; Maßstab: 0,5 mm; Pfeilspitze: Dorsoventralmuskulatur. **9.** Längsschnitt durch die Mitteldarmregion; Maßstab: 0,5 mm; Pfeilspitzen: Dorsoventralmuskulatur; Sterne: Gonaden. Abkürzungen: alm = äußere Längsmuskelschicht der Körperwand, da = Dorsalast des posterioren dorsalen Nervenpoles, dk = Dorsalkommissur des Gefäßsystems, go = Gonade, lm = Längsmuskelschicht der Körperwand, ln = Längsnervenstrang, lnw = Längsnervenstrangwurzel, mdt = Mitteldarmtasche, osg = oberster Ast des Vorderdarmgefäßnetzes, rc = Rhynchocoel, rd = Rhynchodaeum, rm = Ringmuskelschicht der Körperwand, sg = Seitengefäß, svd = subepitheliale Drüsen des Vorderdarms, vdl = Vorderdarmlumen. ▷


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sur des Gefäßsystemes aber Längsmuskelfasern an, wie sie auch weiter hinten in dieser Lage ausgebildet sind. Hier reicht das Rhynchodaeum aufgrund seiner posterioren Erweiterung bis nahe an die Dorsalkommissur heran und besagte Längsmuskelfasern erweisen sich als solche des Rhynchodaeums. Insofern besteht eine gewisse Verbindung zwischen der Längsmuskulatur beider Rhynchodaeum-Abschnitte. Der hintere Abschnitt des Rhynchodaeums besitzt zudem Ringmuskulatur, die vor dem Septum einen dicken Sphinkter ausbildet.

Das Septum ist beinahe geschlossen. Das Rhynchocoel weist weder Divertikel noch Diskontinuitäten auf und reicht bis in den hinteren Körperbereich. Seine Wand besitzt eine Ring- und eine Längsmuskelschicht (Abb. 4-6). Sie zeigen keine Verflechtung mit der Körperwandmuskulatur.

Der Rüssel ist nicht gespalten. Über seine gesamte Länge besteht seine Wand aus einem dicken Epithel, einer anschließenden Ring- und Längsmuskelschicht, sowie dem Endothel. Ein relativ kurzer vorderer Rüsselabschnitt – Durchmesser: 0,5 mm – (Abb. 6) und der Hauptabschnitt – Durchmeser bis zu 1,0 mm – (Abb. 2) sind zu unterscheiden. Im vorderen Abschnitt bildet das Epithel vier Pakete aus, von denen zwei – einander gegenüberliegende – Pakete wesentlich größer sind als die übrigen beiden. In einem der beiden großen Pakete treten Drüsenzellen auf, mit im proximalen Epithelbereich liegendem blau färbbarem Sekret. In den übrigen Paketen dominieren Drüsenzellen mit bräunlich färbbarem, grob granuliertem Drüsensekret. In geringem Ausmaß können in diesen Paketen auch Zellen mit blau färbbarem Sekret auftreten. Zumeist ist die Muskulatur jenes Rüsselsektors, der die Drüsenzellen mit blau färbbarem Sekret enthält, deutlich schwächer entwickelt als in den übrigen Sektoren. Im vorderen Rüsselabschnitt sind die Rüsselnerven kaum identifizierbar, wie auch die beiden Muskelkreuze schwach entwickelt sind. Zumeist aber ist das Muskelkreuz in dem Sektor mit den grob granuliertes Sekret enthaltenden Drüsenzellen kräftiger ausgebildet als das diesem gegenüberliegende Muskelkreuz.

Im Hauptabschnitt des Rüssels sind die Rüsselnerven und die Muskelkreuze deutlich besser entwickelt, wobei das Nerven- und das Muskelkreuz-Paar im rechten Winkel zueinander angeordnet sind. Die beiden Muskelkreuze sind fortgesetzt unterschiedlich stark ausgebildet. Die Paketbildung im Bereich des Rüsselepithels geht verloren, da die grob granulierten Drüsenzellen nun in weitaus geringerer Anzahl auftreten, wohingegen die Zellen mit blau färbbarem Sekret über das gesamte Epithel verstreut vorliegen. Die Rüsselwand ist nun deutlich stärker als davor in Falten gelegt.
Ein Retraktormuskel ist ausgebildet.

Nervensystem. Im Bereich des anterioren Nervenpols entspricht jede Gehirnhälfte (Terminologie zur Gehirnanatomie gemäß Senz & Tröstl 1997) im Querschnitt einem vergleichsweise großen Längsnervenstrang. In diesem Gehirnbereich befindet sich die relativ dicke Dorsalkommissur. Die Faserkerne der Gehirnhälften weisen erst hinter dem Vorderende des Mittelteils des Gehirns, also in etwa hinter dem Vorderende der Ventralkommissur, eine nennenswerte Kompartimentierung auf. Die Ventralkommissur besitzt ventral ihres Faserkernes Ganglienzellkörper. Am Hinterende des Mittelteils des Gehirns tritt eine Aufspaltung in den dorsalen und ventralen posterioren Nervenpol auf. Im Ursprungsbereich ist der dorsale Pol im Querschnitt annähernd um die Hälfte größer als der ventrale Pol. Der dorsale Pol spaltet terminal auf. In ihrem Ursprungsbereich sind seine beiden Äste ungefähr gleich groß. Die Faserkerne beider Äste sind von einem einheitlichen Mantel aus Ganglienzellkörpern umgeben. Der dorsale Ast reicht bis knapp über das Vorderende des Cerebralorgans zurück. An seinem Hinterende fließt er in die Nervenschicht der Körperwand ein. Dies ist im Paratypus umfangreicher ausgebildet als im Holotypus. Der ventrale Ast geht in das Cerebralorgan über. Das Gehirn – somit auch die Äste des dorsalen posterioren Nervenpoles – liegt vollständig distal der Ringmuskelschicht der Körperwand (Abb. 5). Das innere Neurilemma des Gehirns ist zumeist gut entwickelt. Ein distinktes äußeres Neurilemma fehlt. Trotzdem ist eine relativ scharfe Grenze des Gehirns gegenüber der äußeren Längsmuskelschicht gegeben.

Die Längsnervenstränge zweigen kontinuierlich aus dem ventralen posterioren Nervenpol des Gehirns ab. Die Neurilemmata der Längsnervenstränge sind wie jene des Gehirns ausgebildet. Zwischen dem Faserkern und den Ganglienzellpaketen der Längsnervenstränge treten Radiärmuskelfasern auf. Neurochorde, Seitenstamm-Muskelfasern, accessorische Faserstränge und andere Besonderheiten fehlen. Der Dorsalnerv ist unmittelbar hinter dem Gehirn gut entwickelt, ansonst nur an einzelnen Schnitten gegenüber der Nervenschicht der Körperwand histologisch abgrenzbar. Aus den Innenwänden der Längsnervenstrangwurzeln zweigen die Vorderdarmnerven ab. Diese sind vor der Mundöffnung miteinander verbunden. Ab der Mundbucht konnten die Vorderdarmnerven nicht mehr erkannt werden. Das Ursprungsgebiet der Rüsselnerven konnte nicht eruiert werden.

Kopfdrüse und Sinnesorgane. Ein typisches Frontalorgan fehlt, doch mag das Hinterende des vorderen Rhynchodaeum-Abschnittes ein Frontalorgan beinhalten (vgl. oben). Die Kopfdrüse ist auf den Preseptalbereich beschränkt. Sie weist keine Besonderheiten auf.

Ein Paar lateraler Kopfspalten ist ausgebildet (Abb. 1). Sie reichen von der Kopfspitze bis zu den Öffnungen der Cerebralorgankanäle. Sie sind auffallend flach. Ihr Epithel ist arm an Drüsenzellen. Ganglienzellpolster bzw. Sinneszellpolster sind nicht mit den Kopfspalten assoziiert. Als einzige Differenzierung in Zusammenhang mit den Kopfspalten tritt jene der Ringmuskulatur der äußeren Längsmuskelschicht auf (vgl. oben). Knapp, aber signifikant vor den Cerebralorganen (teilweise kontraktionsabhängig) enden die Kopfspalten in jeweils einer einfachen kolbenförmigen Erweiterung. Diese erreichen das Gehirn nicht. Von jeder Erweiterung zweigt daher ein vergleichsweise langer Cerebralorgankanal ab, der zwischen den dorsalen und ventralen posterioren Nervenpol des Gehirns vordringt (Abb. 5). Auf gleicher Höhe spaltet der ventrale posteriore Nervenpol auf, wobei der ventrale Ast zusammen mit dem Cerebralorgankanal nach hinten zu das eigentliche Cerebralorgan ausbildet. Die Cerebralorgane sind gut entwickelt, liegen zunächst aber der Ringmuskelschicht der Körperwand distal an. Diese – wie auch die Längsmuskelschicht der Körperwand – wird an den Berührungsstellen mit den Cerebralorganen caudad dünner, wobei distal der Cerebralorgane Muskelfasern auftreten, die der Ringmuskelschicht zuzuordnen sind. Teilweise stellen sie laterale Verlängerungen des dorsomedianen Bogens der Ringmuskelschicht der Körperwand dar. Im hinteren Bereich der Cerebralorgane werden aus diesen Fasern dorsolaterale Bögen der Ringmuskulatur, die caudad jene proximal der Cerebralorgane ersetzen. Dieserart gelangen die Hinterenden der Cerebralorgane proximad der Körperwand bzw. in Kontakt mit den Seitengefäßen. Die Abgrenzung der Cerebralorgane gegenüber der äußeren Längsmuskelschicht der Körperwand entspricht jener des Gehirns. Die Abgrenzung jedes Cerebralorganes gegenüber dem dorsalen Ast des dorsalen posterioren Nervenpols ist erst im Bereich von dessen Hinterende gegeben.

Ocellen und weitere Sinnesorgane sind nicht ausgebildet.

Gefäßsystem. Am Vorderende der Einengung des Rhynchodaeums tritt jenes der Dorsalkommissur des Gefäßsystems auf (Abb. 1d). Die Dorsalkommissur nimmt jenen Platz ein, der durch die Verengung des Rhynchodaeums frei wird. Caudad gewinnt das Rhynchodaeum wieder an Durchmesser, womit die Spaltung der Dorsalkommissur in die beiden Seitengefäße einhergeht (Abb. 1f). Diese ziehen seitlich des Rhynchodaeums bis zum Septum. Hinter diesem erweitern sie sich, womit die Ventralkommissur des Gefäßsystems zur Ausbildung gelangt. Von diesem zweigt das Dorsalgefäß ab. Es steigt sogleich gegen das Rhynchocoel auf (Abb. 6). Diese Lage verläßt es knapp hinter dem Vorderende des Mitteldarms. Der Komplex aus den Seitengefäßen und der Ventralkommissur wird von den Seitenteilen des Muskelbalkens in geringem Ausmaß zerklüftet. Hieraus erwächst nach hinten zu das Vorderdarm-Gefäßnetz, sowie die Radiärmuskulatur. Das Gefäßnetz ist gut entwickelt (Abb. 7) und reicht bis zum Vorderende des Mitteldarms. Im Mitteldarmbereich sind somit das Dorsalgefäß und die Seitengefäße gegeben, die über seriale Kommissuren miteinander verbunden sind. Die Seitengefäße weisen kaum eigene Muskulatur auf. Um das Dorsalgefäß ist die ventrale Längsmuskelplatte auch in jenem Körperbereich gut entwickelt, in dem sie ansonst weitgehend reduziert ist.

Exkretionsapparat. Der Exkretionsapparat ist auf den hinteren Vorderdarmbereich beschränkt. Die Kanäle des Exkretionsapparates liegen vor allem lateral im Körper, in direktem Kontakt mit dem Gefäßnetz des Vorderdarms. Im hinteren Bereich des Exkretionsapparates besitzt dieser in jenen beiden Gefäßen des Gefäßnetzes die unmittelbar neben dem Rhynchocoel liegen – also in den beiden größten Gefäßen – je einen Hauptsammelkanal. Diese sind bis zu 0,25 mm dick und ziehen knapp über das Hinterende des Vorderdarms hinaus. Soweit es den Schnittserien zu entnehmen ist, weist jede Körperseite einen Ausführgang des Exkretionsapparates auf.

Fortpflanzungsapparat. In beiden untersuchten Individuen liegen zwischen den Seitentaschen des Mitteldarms große, endothelial umkleidete Hohlräume, die Gonaden (Abb. 8, 9). In den Gonadenwänden treten einige undifferenzierte Geschlechtszellen auf. Weitere Geschlechtszellen fehlen. Gonoducte konnten an den Schnittserien nicht festgestellt werden.

Diskussion

Grundlage der folgenden Diskussion ist, daß gegenwärtig keine Systematik des Taxons Nemertini bzw. eines Nemertinentaxons geboten werden kann, so daß es bei einer klassifikatorischen Einteilung belassen werden muß (vgl. Senz 2000 und hierin zitierte Literatur).

Aufgrund der äußeren Längsmuskelschicht der Körperwand, des Baus und der Lage der Cerebralorgane sowie des Gefäßsystems ist das Material den Heteronemertinen zuzurechnen und innerhalb dieser aufgrund der Rüsselmuskulatur in die Gruppe Lineidae sensu Gibson (1985) einzureihen. Innerhalb der Lineidae ist es die Gattung *Lineus* Sowerby, 1806, deren Anatomie – gemäß der Gattungsdefinition von Gibson (1985, 1990a) – mit jener des untersuchten Materials vollständige Übereinstimmung aufweist.

"Amongst the 90 or more species which have been included in the genus *Lineus*, a comparatively few have been adequately described and a secure diagnosis for the taxon is still not possible" (Gibson 1990b: 123). Dies erschwert die Identifikation des Materials auf Artniveau. Es zeichnet sich aber durch eine Reihe von Merkmalen aus, die es von allen bisher beschriebenen Arten eindeutig unterscheiden läßt. Diese Merkmale sind: Laterale Kopfspalten flach und nicht bis direkt zu den Cerebralorganen reichend; äußere Längsmuskelschicht mit Ringmuskulatur; Rhynchodaeum in zwei Abschnitte untergliedert; Mundöffnung signifikant hinter dem Gehirn positioniert; Ringmuskelschicht der Körperwand stark entwickelt; Gehirn vollständig distal der Ringmuskelschicht der Körperwand liegend; Cerebralorgane nur mit ihren Hinterenden gegen die Seitengefäße vordringend. Für das Material wird daher die Art *Lineus nipponensis*, spec. nov. eingerichtet.

Insbesondere die Anatomie der Kopfspalten, die Lage der Cerebralorgane und der Mundöffnung sowie die Stärke der Ringmuskelschicht der Körperwand in *L. nipponensis* stimmen mit den Verhältnissen in *Lineus molochinus* Bürger, 1892 überein (vgl. Bürger 1895 für *L. molochinus*). Diesen Übereinstimmungen stehen aber mehrere Unterschiede gegenüber (vgl. Tab. 1). In den angeführten Merkmalen stimmt *L. nipponensis* zudem mit *Lineus insignis* Senz, 1993 überein (vgl. Senz 1993 für *L. insignis*). Sichere Unterscheidungsmerkmale zwischen beiden Arten ergeben sich unter anderem aus der Rüssel-Anatomie und jener der Kopfspalten im Gehirnbereich (vgl. zudem Tab. 1).

Zum Rhynchodaeum von *L. nipponensis* ist anzumerken: Alternativ zu der hier getroffenen Aussage, daß das Rhynchodaeum in zwei Abschnitte differenziert ist, kann begründet überlegt werden, ob der hier so genannte vordere Rhynchodaeum-Abschnitt als Atrium zu bezeichnen ist, das Rhynchodaeum also auf den Bereich ab dem Vorderende des Zentralzylinders beschränkt ist. Hierfür könnte angeführt werden, daß die Längsmuskulatur des vorderen Kanalabschnittes kontinuierlich in jene des Zentralzylinders übergeht, nicht aber in jene des hinteren Kanalabschnittes (vgl. oben). Von dieser Interpretation ist Abstand genommen worden, vor allem, da die Epithelien der einzelnen Kanalabschnitte keine wesentlichen histologischen Unterschiede aufweisen bzw. die auftretenden Unterschiede kontinuierlich ineinander übergehen. Die angeführte fehlende kontinuierliche Verbindung der Längsmuskulatur der beiden Rhynchodaeum-Abschnitte ist demzufolge in Zusammenhang mit der generell schwachen Entwicklung der Muskulatur proximal der äußeren Längsmuskelschicht im Be-

Tab. 1. Vergleich von *Lineus molochinus* Bürger, 1892, *Lineus insignis* Senz, 1993 und *Lineus nipponensis*, spec. nov.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
L. molochinus	+	+	+	+	+	+	+	–	?	–	1	*a*[1]
L. insignis	–	–	+	+	+	–	+	+	+	–	0	*b*
L. nipponensis	+	+	+	+	+	–	–[2]	+	–	+	2	*c*

1. = Kopfspalten flach und nicht bis zu den Cerebralorganen reichend; **2.** = Ringmuskelschicht der Körperwand dick; **3.** = Mundöffnung nicht unmittelbar hinter dem Gehirn; **4.** = Cerebralorgane nur mit den Hinterenden gegen die Seitengefäße vordringend; **5.** = Ocellen fehlen; **6.** = Gehirn mit Ventralverlagerung; **7.** = dorsaler Ast des posterioren dorsalen Nervenpoles auffallend groß; **8.** = Ringmuskulatur in der preseptalen äußeren Längsmuskelschicht vorhanden; **9.** = Rhynchodaeum mit Untergliederung; **10.** = äußeres Neurilemma des Gehirns stark entwickelt; **11.** = Anzahl der Muskelkreuze des Rüssels; **12.** = berichtetes Verbreitungsgebiet, *a*: Golf von Neapel, *b*: Küste Rovinjs, *c*: Küste Japans.

[1] "Isler's report (1902: 278) of this species occuring in Chile is of doubtful validity" (Gibson 1995: 399).

[2] Die beiden Äste des dorsalen posterioren Nervenpols sind im Ursprungsgebiet aber gleich groß.

reich der Kanalverengung zu sehen. Es bleibt aber zu beachten, daß der Begriff "Atrium" in der Nemertinenforschung erst vage definierbar ist. Gegenwärtig kann auch nicht angegeben werden, welche funktionellen Aspekte mit der Untergliederung des preseptalen Kanals – sowie mit der hiermit zusammenhängenden Konzentration des Zentralzylinders auf den Bereich des hinteren Rhynchodaeum-Abschnittes – verbunden sind. Die Analyse hiervon müßte zudem auf mögliche funktionelle Zusammenhänge hiervon mit der Ringmuskulatur der äußeren Längsmuskelschicht Bedacht nehmen, eine weitere Struktur, die für Heteronemertinen untypisch ist.

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Buchbesprechungen

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Nach den "Schlangen von Venezuela" (Lancini & Kornacker 1989, Caracas [Armitano Editores], 381 S.) liegt nun die zweite Bearbeitung dieser Tiergruppe aus der Feder Paul Kornackers vor. Geboten wird eine zweisprachig (englisch/spanisch) verfaßte Liste der Schlangen des Landes im Paperback-Format; die für jedes Taxon (Gattung, Art, Unterart) gegebenen Informationen umfassen dessen vollständige Synonymie (inklusive der Cresonyme), sowie bei Arten und Unterarten die Angabe der terra typica und eine Beschreibung des Gesamtareals nach Ländern. In einem zentralen Bildteil sind Farbphotos etwa der Hälfte der aufgeführten Taxa zusammengestellt. Bestimmungsschlüssel ermöglichen eine Determination bis auf Unterartniveau. Schließlich finden sich Listen und Graphiken zu den endemischen Formen des Landes, eine Liste der englischen und spanischen Trivialnamen, sowie eine tabellarische Übersicht der Verbreitung der venezuelanischen Schlangen in allen weiteren Staaten Lateinamerikas. Ein Index sowie ein über 600 Zitate umfassendes Literaturverzeichnis runden das Buch ab.

Gegenüber der teils eher populärwissenschaftlich gehaltenen Darstellung von Lancini & Kornacker (1989) werden mittlerweile 28 weitere, inzwischen für das Land neu nachgewiesene oder neu beschriebene Taxa berücksichtigt (182 aktuell vs. 154). Weiterhin sind in der 1989'er Bearbeitung lediglich Bestimmungsschlüssel enthalten, die eine Gattungs-Determination ermöglichen. Schließlich hätten wohl die jetzt präsentierten umfangreichen Synonymielisten sowie das detaillierte Literaturverzeichnis den Rahmen der älteren Venezuela-Monographie gesprengt bzw. einen Teil des seinerzeit anvisierten, breiten Leserkreises abgeschreckt. Damit wird klar, daß die aktuelle Checkliste keineswegs als gleichrangige Konkurrenz zur ersten Monographie von 1989 zu verstehen, sondern eher als eine Ergänzung dazu gedacht ist.

Die Farbphotos des zentralen Bildteils sind bis auf wenige Ausnahmen gut und lockern (wie auch die als Textabbildungen eingegliederten, überaus genau gezeichneten Portraits) den ansonsten naturgemäß eher trockenen Stoff etwas auf. Dabei hätten die Unterschriften der Photos, die nur aus dem wissenschaftlichen Namen der Art bestehen, aber teils etwas ausführlicher sein können: z.B. fehlen bei den Abb. 43-45 Verweise auf Jugend- bzw. Adultfärbung bei *Mastigodryas boddaerti* und bei Abb. 73 ein Verweis auf den dort dargestellten Geburtsvorgang bei *Bothriechis schlegelii*. Eine schöne Ergänzung des Buches wäre auch eine tabellarische Übersicht über das Vorkommen der einzelnen Arten in den naturräumlichen Einheiten Venzuelas gewesen. Dies sind letztendlich aber nur randliche, kleinere Defizite, die den insgesamt sehr guten Gesamteindruck kaum schmälern können.

Kornackers Checkliste ist aufgrund ihres relativ geringen Umfangs als Bestimmungswerk auf Exkursionen gut mitzuführen. Darüber hinaus machen die verschiedenen Listen das Werk auch zu einer Datengrundlage für umfassendere Analysen zur Biodiversität. Schließlich ermöglicht das ausführliche Literaturverzeichnis auch wenig erfahrenen Personen einen leichten Einstieg in die Schlangenfauna von Venezuela. Rundum also eine schöne, professionelle (und aus wissenschaftlicher Sicht notwendige) Ergänzung der früheren Darstellung, die in keiner Literatursammlung zur südamerikanischen Reptilienfauna fehlen darf. Es ist zu hoffen, daß besonders durch die nun zur Verfügung stehenden, umfassenden Bestimmungshilfen die Erforschung der Schlangenfauna des Landes weiterhin katalysiert wird, ein Effekt der sich zuvor schon bei vielen ähnlichen Werken eingestellt hat.

M. Franzen

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Taxonomic notes on chitons. 1. *Trochodochiton* de Rochebrune, 1884 – a genus which was fallen into oblivion

(Mollusca, Polyplacophora, Mopaliidae)

Enrico Schwabe

Schwabe, E. (2001): Taxonomic notes on chitons. 1. *Trochodochiton* de Rochebrune, 1884 – a genus which was fallen into oblivion (Mollusca, Polyplacophora, Mopaliidae). – Spixiana **24/1:** 15-18

The taxonomic position of de Rochebrune's genus *Trochodochiton* is discussed. The genus is characterized by the presence of precephalic tentacles. Investigations of the syntypes of *Chiton coronatus* Fischer MS, Locard, 1898 have shown that this species refers to de Rochebrune's description and, therefore, the species herein is designated as the type species of the genus *Trochodochiton*. As *C. coronatus* is a junior synonym of *Placiphorella atlantica* (Verrill & S. I. Smith, 1882), *Trochodochiton* falls into the synonymy of *Placiphorella* Carpenter MS, Dall, 1879. A lectotype and paralectotype were selected from the syntypes of *Chiton coronatus*.

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Introduction

The taxonomy of de Rochebrune's genus *Trochodochiton* is doubtfull, as its description was not related to a certain species. The material on which the description of the new genus was based, was collected during the *Talisman* – expedition from off West Sudan and is still available in the Muséum National d'Histoire Naturelle in Paris (MNHN).

An investigation of the syntypes shows, that *Chiton coronatus* Fischer MS, Locard, 1898 in all respects agrees with de Rochebrune's description, and it is herein designated to be the type species of *Trochodochiton*.

Because the description of the new taxon is available in the sense of the International Code of Zoological Nomenclature and a type species is now known for it, the genus should no longer be ignored by recent authors.

Abbreviations used in text

nom. null. – misspelling of a taxon
OD – orginal designation
SD – subsequent designation
M – designation by monotypy
MS – manuscript name

Systematic part

Polyplacophora Gray, 1821
Mopaliidae Dall, 1889

Trochodochiton de Rochebrune, 1884

Trochodochiton, Van Belle 1983: 115 (marked with a "?" in synonym of *Placophoropsis* Pilsbry, 1893)
Trochochiton, Kaas & Van Belle 1994: 318 [nom. null.]

De Rochebrune (1884: 754) has described his new genus as follows:

"Le *Talisman* a recueilli quelques espèces de ce groupe très rare dans les grandes profondeurs; quelques échantillons d'un type remarquable méritent d'attirer l'attention; par leur aspect général on les prendrait à première vue pour des spécimens de *Lepidopleurus* de taille ordinaire, mais ce quiles distingue tout particulièrement, c'est la présence autour de la région céphalique d'appendices quadrangulaires régulièrement espacés et donnant à la partie qu'ils occupent la forme d'une roue dentelée; ce caractère spécial et que l'on ne retrouve chez aucune autre espèce de cette classe suffit pour autoriser la création d'un genre, qui dès lors devrait être inscrit sous le nom de *Trochodochiton* (de Rochebrune)."

[The *Talisman* has collected some species of this group which are very seldom in great depths. Several specimens of a remarkable type deserve special attention. From their general appearance one would rather associate them with the species of *Lepidopleurus*. But what makes them especially different are rectangular appendages of regular intervals in the cephalic region which gives the part they occupy the shape of a toothed wheel; this feature and the fact that it is unknown from other species of this class brings about the necessity to relate them to a new genus which from now on should be termed as *Trochodochiton* (de Rochebrune).]

[Die *Talisman* hat einige Arten dieser Gruppe gesammelt, die in großen Tiefen sehr selten sind; einige Proben eines bemerkenswerten Typus verdienen besondere Aufmerksamkeit; von ihrem Äußeren würde man sie auf den ersten Blick als Arten von *Lepidopleurus* von gewöhnlicher Größe halten, was sie aber ganz speziell unterscheidet, sind viereckige Anhängsel von regelmäßigem Abstand im Kopfbereich, was der von ihnen besetzten Partie die Form eines gezähnten Rades gibt; dieses spezielle Merkmal und die Tatsache, daß man es bei keiner anderen Art dieser Klasse findet, ist Anlaß genug, sie einer neuen Gattung zuzuordnen, die von nun an mit dem Namen *Trochodochiton* (de Rochebrune) bezeichnet werden soll.]

The species of Polyplacophora collected during the *Talisman* – expedition (Locard 1898) are *Chiton coronatus* Fischer MS, Locard, 1898 and *Acanthochites* [= Acanthochitona] *fascicularis* (Linnaeus, 1767). The latter species can be excluded, as it doesn´t show the features described by de Rochebrune: it lacks the appendages in the head area and the valve surface is in no way *Lepidopleurus* – like, and the tegmentum is strongly granulated, divided into pleural and jugal areas, which is not the case in *Lepidopleurus*. Beside this features the girdle in *Acanthochitona* bears usually 18 hair tufts, whereas in *Lepidopleurus* the girdle is clothed with scales interspaced with hyaline spicules.

The syntypes of *Chiton coronatus* (collected at stations 78 & 71 in a depth of 640-698 m from off West Sudan) fits in all respects with de Rochebrune´s description, i.e. regarding the presence of precephalic tentacles (Fig. 1A). Therefore *Chiton coronatus* is here designated to be the type species of *Trochodochiton*.

From the type material (MNHN), the author designates herewith the complete specimen (by Locard 1898 as fig. 25 on plate IV) as lectotype (Figs 1B-1C) and the other partly disarticulated specimen (it lacks the first three plates) as paralectotype (figured as 23 & 26, by Locard).

The lectotype measures ca. 11.4 × 7mm and bears 9 gills on the right and 8 gills on the left side of the foot. The paralectotype (ca. 16.9 × 9.8 mm) has 14 gills on the right and 16 on the left side of the foot. Both specimens are strongly curled and the girdle is bent inwards. It appears that due to contraction of the specimens Locard just estimated the sizes (21 × 16 mm by Locard); the external features figured by Locard (Figs 23-26) agree with the material examined herein.

Thiele (1909: 9, 31) has correctly shown, that *Chiton coronatus* is identical with *Placiphorella atlantica* (Verrill & S. I. Smith, 1882), which makes *Trochodochiton* a junior subjective synonym of *Placiphorella* Carpenter MS, Dall, 1879.

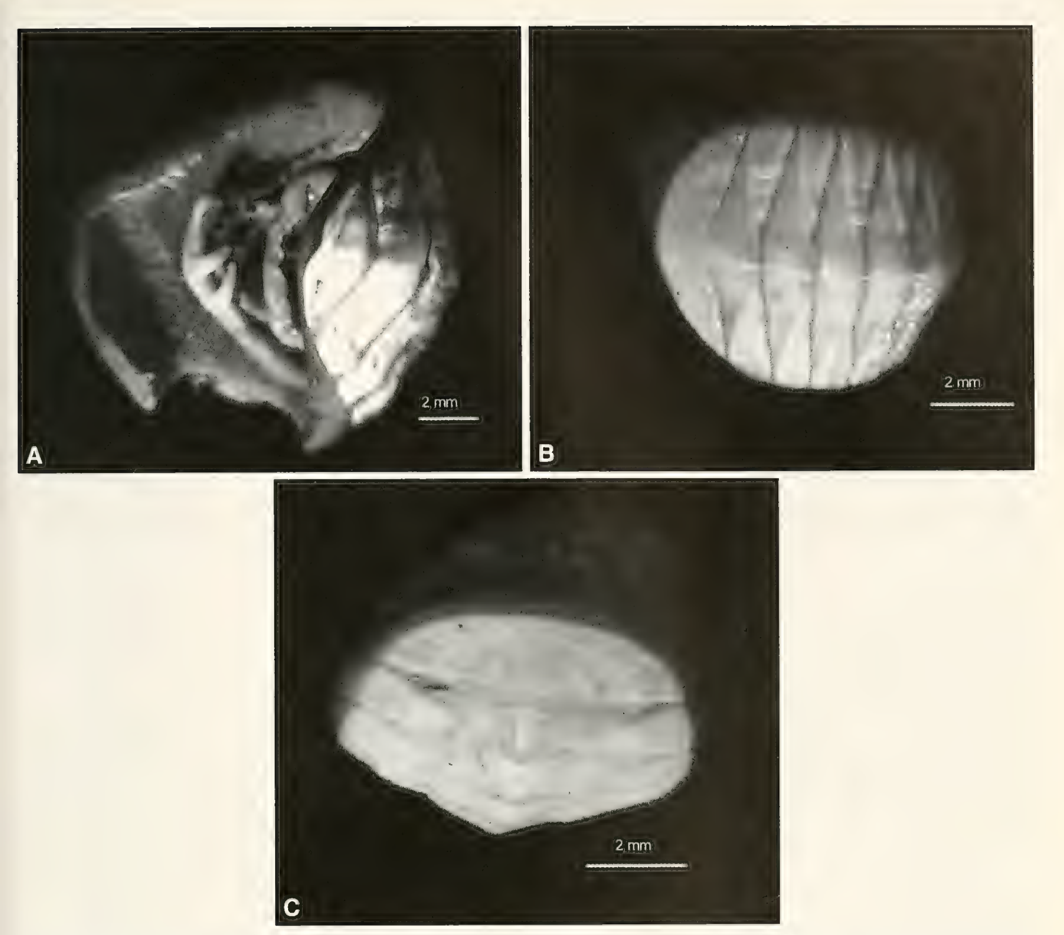


Fig. 1. *Chiton coronatus* Fischer MS, Locard, 1898. **A.** Paralectotype in ventral view, showing the precephalic tentacles. **B.** Lectotype, whole animal in dorsal view. **C.** Lectotype, detail anterior part, showing the girdle expansion.

Based on the preceeding recognitions the synonymy of *Placiphorella* should read as follows:

Placiphorella Carpenter MS, Dall, 1879 (pp. 298, 303) (*Placiphorella velata* Carpenter MS, Dall, 1879), OD
Euplacophora Verrill & S. I. Smith, 1882 (p. 365 [footnote]) (*Placophora (Euplacophora) atlantica* Verrill & S. I. Smith, 1882), M
Trochodochiton de Rochebrune,1884 (p. 754) (*Chiton coronatus* Fischer MS, Locard, 1898), SD, herein
Placophorella Fischer, 1885 [nom. null.] (p. 882)
Placophoropsis Pilsbry, 1893 (p. 313) (*Placophora (Euplacophora) atlantica* Verrill & S. I. Smith, 1882), M
Plaxiphorella Pelseneer, 1898 [nom. null.] (p. 14)*
Langfordiella Dall, 1925 (p. 96) (*Langfordiella japonica* Dall, 1925), OD
Euplaciphora Kaas & Van Belle, 1994 [nom. null.] (p. 318) *non* Carpenter in Dall, 1879 (= nom. null. *pro* *Euplaxiphora* Shuttleworth, 1853 = *Plaxiphora* Gray, 1847)
Trochochiton Kaas & Van Belle, 1994 [nom. null.] (p. 318)
Praciphorella Matsukuma & Tsubaki, 1995 [nom. null.] (p. 92)

* only *Plaxiphorella tentaculifera* Pelseneer was listed, without a description of this species.

Zusammenfassung

Die Gattung *Trochodochiton,* von de Rochebrune für eine Tiefwasserart von W-Sudan aufgestellt, die während der *Talisman* – Expedition gesammelt wurde, ist charakterisiert durch das Vorhandensein von Tentakeln im Kopfbereich.

Da das *Talisman* – Material im Pariser Nationalmuseum archiviert ist, war eine Untersuchung der Art möglich, die der Beschreibung von de Rochebrunes neuer Gattung zugrunde lag. Es handelt sich um *Chiton coronatus* Fischer MS, Locard, 1898, eine Art die tatsächlich Tentakeln im Kopfbereich aufweist und deshalb hiermit als Typart für *Trochodochiton* festgelegt wird. Da aber *C. coronatus* ein jüngeres Synonym von *Placiphorella atlantica* (Verrill & S. I. Smith, 1882) ist, kann de Rochebrunes Gattung nicht als valides Taxon benutzt werden, sondern muß in die Synonymie von *Placiphorella* Carpenter MS, Dall, 1879 transferiert werden.

Für die Syntypen von *C. coronatus* werden der Lectotyp und der Paralectotyp festgelegt.

Acknowledgements

Dr. Philippe Bouchet and Dr. Virginie Heros (Muséum National d'Histoire Naturelle, Paris) are thanked for the loan of the syntypes of *Chiton coronatus* such as for the important hints for literature. Thanks are also due to Eva Lodde and Michael Schrödl (Zoologische Staatssammlung München) for correcting the english parts. Special thanks are due to Mrs Albrecht (Zoologische Staatssammlung München) who kindly translated the french text.

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Description of *Allocyclops montenegrinus*, spec. nov. and a revision of the genus *Allocyclops* Kiefer, 1932

(Crustacea, Copepoda, Cyclopoida)

Tomislav Karanovic

Karanovic, T. (2001): Description of *Allocyclops montenegrinus*, spec. nov. and a revision of the genus *Allocyclops* Kiefer, 1932 (Crustacea, Copepoda, Cyclopoida). – Spixiana **24/1:** 19-27

A new species of the genus *Allocyclops* Kiefer, 1932 is described on the basis of a single female collected from subterranean waters in Montenegro (SE Europe). This genus is revised and divided into three subgenera: *Allocyclops* s. str., *Psammocyclops* Kiefer, 1955, and *Stolonicyclops* Reid & Spooner, 1998. Also, two species from the genus *Speocyclops (S. transsaharicus* and *S. orcinus)* are transferred to the genus *Allocyclops*. The species *Allocyclops ritae* Dumont & Lamoot, 1978 is found as a synonym of *Psammocyclops excellens* Kiefer, 1955. With the addition of the new species, and after this revision, the genus *Allocyclops* now includes twelve species throughout the world. At the end of this paper a key for their determination is given.

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Introduction

The genus *Allocyclops* was established by Kiefer (1932) to accommodate a new species, *A. chappuisi*, which he redescribed very soon after that description (Kiefer 1933), also from Ivory Coast. At the same time Kiefer (1933a) described one new species from Macedonia, *Cyclops (Diacyclops) minutissimus*, but in some further papers he doubted about its taxonomic position (Kiefer 1937, 1937a). Redescription of this species by Petkovski (1971), and its allocation to the genus *Allocyclops*, finally resolved its taxonomic status.

However, another taxonomic problem caused more confusion which maintained until today. It is related to the description of a new species from France, *Speocyclops orcinus*, which is based only on a single male (Kiefer 1937b). The isolated position of this species within the genus was noticed already by Petkovski (1954). Dussart (1967) even refused to place it in the genus *Speocyclops*. However, a lot of copepodologists left this species in the genus *Speocyclops*, without particular comments (Rylov 1948, Lescher-Moutoue 1967, 1973, 1986, Kiefer 1978, Dussart & Defaye 1985). Although the description was very poor in detail, there is no doubt that this species belongs to the genus *Allocyclops*. The appearance of the endopodite of the fourth swimming leg, as well as the fifth leg (although it was hardly visible at that time and especially difficult for the verbal description) confirm this claim. Similar situation is with *Metacyclops arenicolus*, which was described from Lake Nyasa (Fryer, 1956) and until now considered as a member of the genus *Bryocyclops* (see Dussart & Defaye, 1985). Chappuis (1951) described *Allocyclops cavicola* from a cave in Zaire, and Petkovski (1971) described *Allocyclops kieferi* from interstitial waters in Macedonia. Later Dumont & Lamoot (1978) described *Allocyclops ritae* from Ivory Coast, but strange enough as the second species in the genus (even though four species were known by that time).

Even more strange was that the same authors three years later (Lamoot et al. 1981) described a very similar species from Ivory Coast in the genus *Speocyclops (S. transsaharicus).* This species also belongs to the genus *Allocyclops,* although in the meantime it was uncritically accepted by few authors as the first representative of the genus *Speocyclops* in tropical Africa (Dussart & Defaye 1985, Lescher-Moutoue 1986). Plesa (1981) described *Allocyclops botosaneanui* from a cave in Cuba. Dussart (1984) described *Allocyclops neotropicalis* from Venezuela only after the male which Reid (1988) correctly transferred to a new genus, *Yansacyclops.* Rocha & Bjorberg (1988) described *Allocyclops silvaticus* from Brazil and remarked: "*Allocyclops* badly needs revision". Reid & Spooner (1998) described *Stolonicyclops heggiensis* as a new genus and new species from the USA, but there are not enough differential characteristics between this genus and the genus *Allocyclops.* They did not compare it with *Allocyclops ritae,* which also has endopodite of the fourth swimming leg slightly fused. Partial oligomerization of that appendage was known as a specific variability (Monchenko 1974) in some species in the genus *Metacyclops.* We think that *Stolonicyclops heggiens* also belongs to the genus *Allocyclops.*

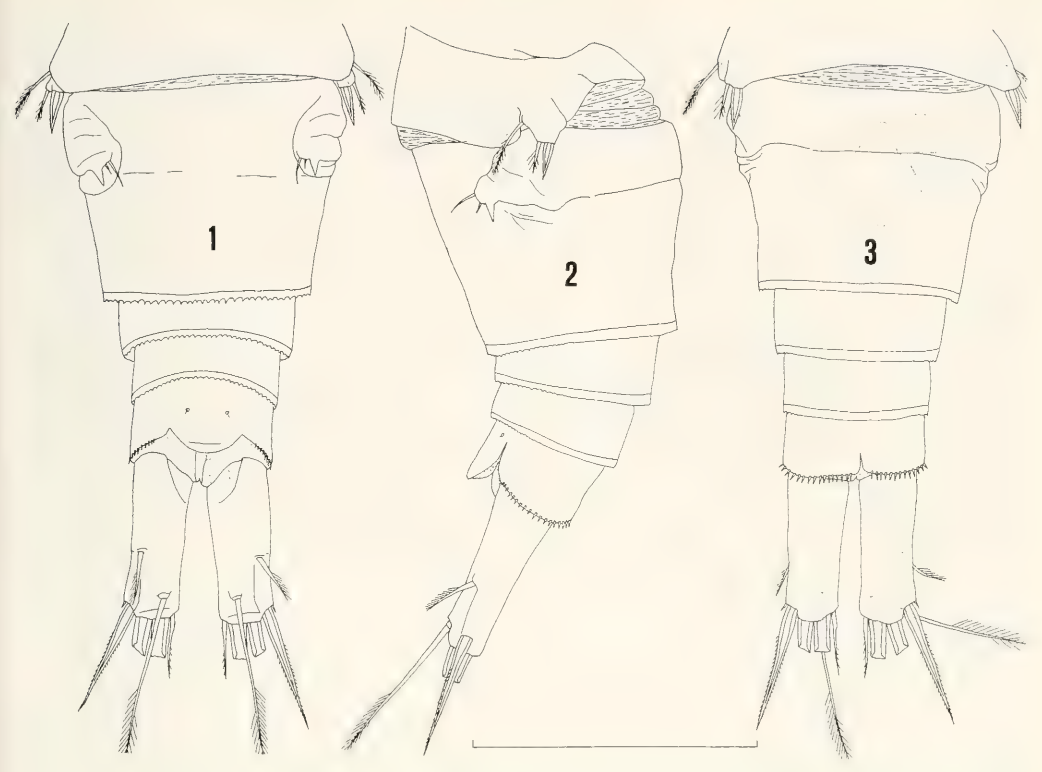
At the end we must mention one more curiosity. Kiefer (1955, 1956) twice described *Psammocyclops excellens,* as a new genus and new species from Madagascar. His description of the fifth leg was very provisional, although later it was uncritically accepted by many authors. From the drawings of that appendage of the male it is clear that the fifth leg is not a distinct segment, but completely fused to the somite. Even more, we think that this species is synonymous (of course the older one) with *Allocyclops ritae* Dumont & Lamoot, 1978 which is mentioned before. So, until now eleven species were known in the genus *Allocyclops.* During an investigation of the copepod fauna in Montenegro, a further new species of that genus was identified. This new species is herein described as *A. montenegrinus,* spec. nov. Also a revision of the genus *Allocyclops* is proposed.

Material and Methods

The sample was collected using the Karaman-Chappuis method from interstitial waters of a very small and nameless stream in the village Vrela, near the town Cetinje, Montenegro, SE Europe (type locality), on May 9, 1998. The material was preserved by adding several drops of 36 % formaldehyde. Copepods were separated with a Wild-M5 stereomicroscope and moved to 70 % ethyl alcohol. Specimens were dissected in a mixture of equal parts of distilled water and glycerol, with fine entomological needles (mark 000). Dissected appendages were placed on a slide, in the same mixture of distilled water and glycerol, and covered with a coverslip. For larger parts (abdomen, etc.) two human hairs were mounted between slide and coverslip, so the parts could not be crushed. During the examination water slowly evaporates, and after some time appendages remain in the pure glycerol. All drawings have been prepared using a drawing attachment (tube) on a Leica-DMLS microscope, with C-PLAN achromatic objectives. Dissected appendages were preserved in Faure's medium. Non-dissected specimens, after examination, were again preserved in 70 % ethyl alcohol. In that sample following species were found:

1. *Diacyclops bicuspidatus* (Claus, 1857) – 2♂♂, 6♀♀
2. *Diacyclops bisetosus* (Rehberg, 1880) – 5♂♂, 5♀♀ (3 ovigerous)
3. *Allocyclops montenegrinus,* spec. nov. – 1♀ (holotype)
4. *Bryocamptus* (s. str.) *minutus* (Claus, 1863) – 6♂♂, 13♀♀ (6 ovigerous), 2 copepodids
5. *Bryocamptus (Rheocamptus) pygmaeus* (Sars, 1863) – 5♂♂, 17♀♀ (2 ovigerous)

All specimens are deposited in the author's collection in Italy. The holotype of the new species (*Allocyclops montenegrinus*) was completely dissected and mounted on a slide in Faure's medium (Number: 9/43/0606/e). In the description, diagnosis, keys and figure legends no abbreviations were used.



Figs 1-3. *Allocyclops montenegrinus* spec. nov., holotype (female 0.563 mm). **1.** Urosome, dorsal view. **2.** Urosome, lateral view. **3.** Urosome, ventral view. Scale = 0.1 mm.

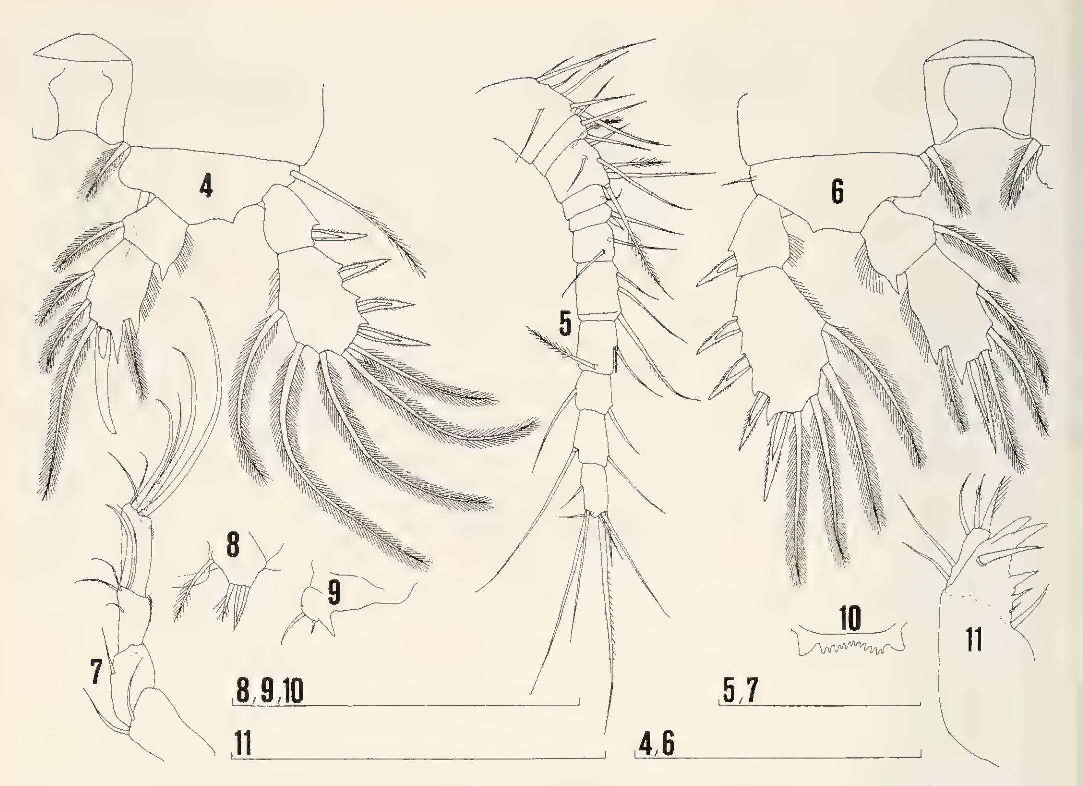
Results

Allocyclops montenegrinus, spec. nov.
(Figs 1-18)

Holotype: ♀, stream near Vrela, near Cetinje, Montenegro, SE Europe, May 9, 1998.

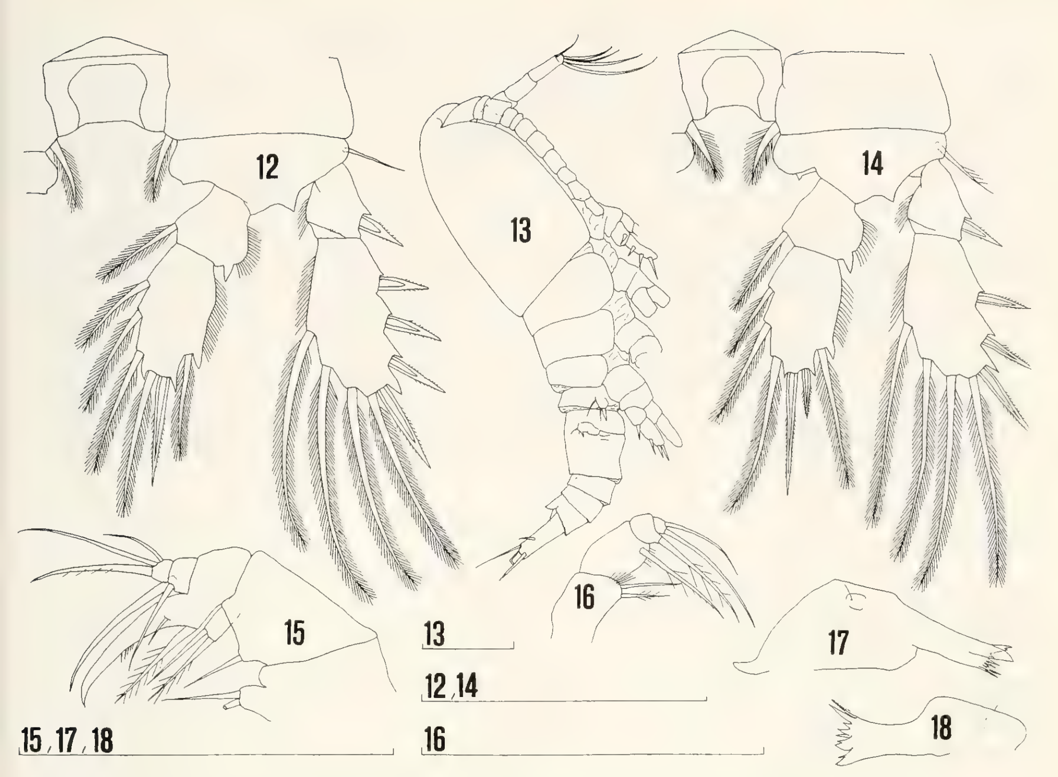
Description

Female. Body length, excluding furcal setae, 0.563 mm. Habitus compact, dorsoventrally compressed. Prosome comprising cephalothorax, incorporating first pedigerous somite, and 3 free pedigerous somites. Surface of dorsal shield covering cephalothorax without any ornamentation, as well as 3 free pedigerous somites (Fig. 13). Body widest at prosomite first pedigerous somite. Urosome comprising fifth pedigerous somite, genital double-somite (representing fused genital and first abdominal somites), and 3 free abdominal somites. More or less sclerotized joint (as pseudosomite) present between prosome and urosome, as well as between fifth pedigerous somite and genital double-somite (Figs 2, 13). Body colourless, nauplius eye absent. Genital double-somite about 1.3 times broader than long, trapeziform, with hind margin ventrally smooth and dorsally serrated (Figs 1, 3). Genital apertures placed dorsolaterally at the first third, and covered by operculum derived from fused sixth legs. Seminal receptacle with broad anterior and ovoid posterior expansions (Fig. 3). First and second free abdominal somites with hind margins ventrally smooth and dorsally serrated. Anal somite ornamented with pair of sensillae, and with row of spinules along posterior margin. Anal operculum convex, not reaching beyond limit of anal somite. Anal sinus smooth (Fig. 1). Furcal rami slightly divergent, close, without ornamentation, and about 2.7 times longer than wide (Fig. 3). Lateral seta inserted dorsolaterally, just to midlength of ramus. Dorsal seta slightly longer than ramus. Outermost



Figs 4-11. *Allocyclops montenegrinus*, spec. nov., holotype (female 0.563 mm). **4.** First swimming leg. **5.** Antennula. **6.** Second swimming leg. **7.** Antenna. **8.** Fifth leg. **9.** Sixth leg. **10.** Labrum. **11.** Maxillula. Scales = 0.1 mm.

apical seta very stout (spiniform), subterminal, and about twice longer than innermost apical seta. Two middle apical setae broken (Fig. 1). Rostrum large, even wellrounded, but not reaching beyond end of antennula first segment (Fig. 13). Antennula 11-segmented, shorter than cephalothorax, with short aesthetasc on eighth segment and setal formula as follows: 7.3.7.1.2.2.3.2.2.2.8 (Fig. 5). Distal seta on fifth segment very stout and short (maybe spiniform). Antenna 4-segmented, without seta representing exopodite (Fig. 7). No ornamentation visible on surface of basipodite. This appendage makes right angle with body ose (Fig. 13), and with setal formula as follows: 2.1.5.6 (Fig. 7). Labrum with strong teeth on posterior margin, but without any other ornamentation (Fig. 10). Mandibula with strong teeth on distal end of coxa (Fig. 18), and with palp represented by only 1 very thin and short seta (Fig. 17). Maxillula comprised of elongated praecoxa and 1-segmented palp (Fig. 11). Praecoxa arithrite with 7 smooth setae and spines, while palp bears 2 apical (plumose) and 3 lateral (smooth) setae. Maxilla 5-segmented, comprising praecoxa, coxa, basis, and 2-segmented endopodite (Fig. 15). Praecoxa with proximal endite bearing 2 setae (proximal one broken), and distal endite unarmed and very small. Coxa with 2 endites; proximal with 1 smooth seta, distal endite highly mobile and bearing 1 plumose and 1 smooth setae. Basis drawn out into claw, with 5 teeth on inner margin and 2 setae. First endopodite segment armed with 2, second with 3 setae (Fig. 15). Maxilliped 4-segmented, with setal formula as follows: 2.1.1.2 (Fig. 16). All swimming legs with smooth coxae, and 1 plumose seta on their inner-distal corner (Fig. 4, 6, 12 and 14). Couplers (intercoxal sclerites) without surface ornamentation. Basis of each swimming leg with epipodite seta on outer margin, especially well-developed on first leg (Fig. 4). Basis of first leg also with short and stout spine on distomedial corner. That corner on other swimming legs with small spinous process. All swimming legs with 2-segmented endopodites and exopodites. First exopodite segment of all legs lacking seta, and bearing 1 outer spine. Second exopodite segments with spine formula 3.4.4.3, and setal formula 5.4.4.4. First endopodite segment of all legs bearing 1 seta on inner-distal corner. Second endopodite segment of first swimming leg with 3 inner setae, 1 smooth and



Figs 12-18. *Allocyclops montenegrinus*, spec. nov., holotype (female 0.563 mm). **12.** Third swimming leg. **13.** Habitus, lateral view. **14.** Fourth swimming leg. **15.** Maxilla. **16.** Maxilliped. **17.** Mandibula. **18.** Mandibula. Scales = 0.1 mm.

curved apical spine, and 1 outer seta (Fig. 4). Second endopodite segment of second swimming leg with 2 inner setae, 1 apical seta, 1 apical spine, and 1 outer seta (Fig. 6). The same segment of third leg with 1 more inner seta (Fig. 12). Second endopodite segment of fourth swimming leg with 3 inner setae, 2 apical spines (inner spine about 2.4 times longer than outer one), and 1 outer seta (Fig. 14). This segment about 1.7 times longer than broad. Outer margins of endopodites, as well as inner margins of exopodites, of all swimming legs (except first exopodite segment of first leg) ornamented with rows of long pinnules. Also, all setae (except epipodite setae on second and third legs) are plumose. Fifth leg inserted laterally and fused to somite (Fig. 2). Remnant of proximal segment only 1 plumose and short (in comparison with somite) seta. Distal segment like small protrusion, and with inner short and stout spine and even shorter outer seta (Fig. 8). Sixth leg inserted dorsolaterally, consisting of small plate bearing 2 short and smooth setae (dorsal seta about 2.7 times longer) and 1 short and smooth spine, completely fused to leg (Fig. 9). This leg also fused to somite, and covers genital aperture.
Male. Unknown.

Etymology. The species name *montenegrinus* is taken from the name of republic Montenegro where the material was collected, i.e., as an adjective agreeing in gender with the (masculine) generic name.

Distribution. At present *Allocyclops montenegrinus*, spec. nov. is known only from type locality. We suppose that it inhabits a wide area of south Dinaric Alps.

Revision of the genus *Allocyclops* Kiefer

Order Cyclopoida Sars, 1886
Family Cyclopidae Burmeister, 1834
Subfamily Cyclopinae Dana, 1853

Genus *Allocyclops* Kiefer, 1932

Diagnosis (emended). Small species, body length ranging from 0.41 to 0.8 mm. Genital double-somite broader than long, with genital apertures placed at the first half. Anal operculum broad, convex or quadrate, slightly shorter than anal somite, equal, or slightly longer. Furcal rami stout, from 1.5 to 3.5 times longer than wide, and with lateral seta inserted after the first third. Antennula 11-segmented, shorter than cephalothorax. Maxilliped 4-segmented. All swimming legs with 2-segmented endopodites and exopodites (that are almost equally long), without any sexual dimorphism. Sometimes endopodite of fourth swimming leg slightly fused. Fifth leg inserted laterally and fused to somite. Remnant of proximal segment only 1 seta. Distal segment like small protrusion, bearing two short setae or (more frequently) inner spine and outer seta.

Type species: *Allocyclops chappuisi* Kiefer, 1932.

Subgenus *Allocyclops* Kiefer, 1932

Diagnosis. Antenna without seta representing exopodite. Maxillular palp 1-segmented. Coxae of all swimming legs with seta on their inner-distal corner. Second endopodite segment of fourth swimming leg with 3 inner setae, 2 apical spines (inner spine longer than outer one), and 1 outer seta. Seta remnant proximal segment of fifth leg short in comparison with somite.

Type species: *Allocyclops* (s. str.) *chappuisi* Kiefer, 1932.

Additional species: *Allocyclops* (s. str.) *cavicola* Chappuis, 1951; *A.* (s. str.) *botosaneanui* Plesa, 1981; *A.* (s. str.) *orcinus* (Kiefer, 1937) comb. nov.; *A.* (s. str.) *montenegrinus*, spec. nov.; *A.* (s. str.) *kieferi* Petkovski, 1971; *A.* (s. str.) *minutissimus* (Kiefer, 1933); *A.* (s. str.) *arenicolous* (Fryer, 1956), comb. nov.

Key to the species of the subgenus *Allocyclops*

1. Innermost apical seta on furcal rami longer than outermost one .... 2.
– Innermost apical seta on furcal rami shorter than outermost one .... 4.

2. Anal operculum short and quadrate .... 3.
– Anal operculum clearly convex .... *A.* (s. str.) *chappuisi* Kiefer, 1932

3. Furcal rami more than 3 times longer than wide .... *A.* (s. str.) *cavicola* Chappuis, 1951
– Furcal rami less than 3 times longer than wide .... *A.* (s. str.) *botosaneanui* Plesa, 1981

4. Anal operculum smooth .... 5.
– Anal operculum finely serrated .... *A.* (s. str.) *orcinus* (Kiefer, 1937) comb. nov.

5. Basis of first leg with spine an distomedial corner .... 6.
– Basis of first leg without that spine .... *A.* (s. str.) *arenicolous* (Fryer, 1956) comb. nov.

6. Setal formula on second exopodite segments of swimming legs is 5.5.5.5 .... 7.
– Setal formula on second exopodite segments of swimming legs is 5.4.4.4 .... *A.* (s. str.) *montenegrinus*, spec. nov.

7. Furcal rami about 3 times longer than wide; innermost apical seta on ramus about 2 times shorter than outermost one .... *A.* (s. str.) *kieferi* Petkovski, 1971
– Furcal rami about 1.5 times longer than wide; innermost apical seta on ramus slightly shorter than outermost one .... *A.* (s. str.) *minutissimus* (Kiefer, 1933)

Subgenus *Psammocyclops* Kiefer, 1955

Diagnosis. Antenna with short seta representing exopodite. Maxillular palp 1-segmented. Coxae of all swimming legs with seta on their inner-distal corner. Second endopodite segment of fourth swimming leg with 2 or 3 inner setae, 1 apical spine, and 1 outer seta. Seta remnant proximal segment of fifth leg long in comparison with somite, changing habitus of animal in dorsal view.

Type species: *Allocyclops (Psammocyclops) excellens* (Kiefer, 1955) comb. nov. [synonym: *Allocyclops ritae* Dumont & Lamoot, 1978].

Additional species: *Allocyclops (Psammocyclops) transsaharicus* (Lamoot, Dumont & Pensaerat, 1981) comb. nov.; *A. (P.) silvaticus* Rocha & Bjornberg, 1988.

Key to the species of the subgenus *Psammocyclops*

1. Second endopodite segment of fourth swimming leg with 3 inner setae .... 2.
– Second endopodite segment of fourth swimming leg with 2 inner setae .... *A. (P.) excellens* (Kiefer, 1955) comb. nov.

2. Spine formula on second exopodite segments of second, third and fourth swimming legs is 3.3.2 .... *A. (P.) silvaticus* Rocha & Bjornberg, 1988
– Spine formula on second exopodite segments of second, third and fourth swimming legs is 4.4.3 .... *A. (P.) transsaharicusus* (Lamoot, Dumont & Pensaert, 1981) comb. nov.

Subgenus *Stolonicyclops* Reid & Spooner, 1998

Diagnosis (emended). Antenna without seta representing exopodite. Maxillular palp 2-segmented. Coxae of second, third and fourth swimming legs without seta on their inner-distal corner. Second endopodite segment of fourth swimming leg with 3 inner setae, 1 apical spine, and 1 outer seta. Seta remnant proximal segment of fifth leg relatively long in comparison with somite, but not changing habitus of animal in dorsal view.

Type and single species: *Allocyclops (Stolonicyclops) heggiensis* (Reid & Spponer, 1998) comb. nov.

Discussion

The systematics of the genera included in the subfamily Cyclopinae recently was discussed by many authors (Dussart & Defaye 1985, Reid 1993, 1999, Pesce 1996, Ferrari 1998, Rocha et al. 1998, Reid et al. 1999). Now, like fifty years ago, the most important systematic character at generic level is the morphology of the fifth leg. Until now, only seven genera are known with fifth leg completely fused to somite: *Austriocyclops* Kiefer, 1964; *Bacillocyclops* Lindberg, 1956; *Bryocyclops* Kiefer, 1927; *Allocyclops* Kiefer, 1932; *Haplocyclops* Kiefer, 1952; *Palaeocyclops* Monchenko, 1972; and *Yansacyclops* Reid, 1988. The genera *Austriocyclops* and *Bacillocyclops* have the fifth leg reduced to a single seta or spine. Five other genera have the fifth leg completely fused to the somite, but all three setae remain (two from distal, and one from proximal segment).

The genus *Bryocyclops* differs from the genus *Allocyclops* by the following features: sexual dimorphism in swimming legs; endopodite of the fourth swimming leg always considerably shorter than exopodite (even when it is 2-segmented); distal segment of the fifth leg does not remain as a small protrusion; and anal operculum always produced posteriorly. This genus indeed has confused systematics (Reid 1999), and also needs revision.

The genus *Haplocyclops* is revalidated by Rocha et al. (1998), and differs from *Allocyclops* as follows: genital apertures placed at the second half of the genital double-somite; lateral seta on furcal rami inserted in the first third; antennula without seta on the inner margin of the ultimate segment; distal segment of the fifth leg does not remain as a small protrusion; and endopodite of the fourth swimming leg 1-segmented.

The genus *Palaeocyclops* is monospecific, known from the Kisilkum Desert (Monchenko 1972). It differs from *Allocyclops* by the very long anal operculum, as well as by presence of sexual dimorphism

in swimming legs, and absence of any spine on endopodite of the fourth swimming leg.

The genus *Yansacyclops* is also monospecific, known from Brazil (Reid 1988). It differs from the genus *Allocyclops* by the following features: genital double-somite longer than broad; anal operculum very short, placed in the first half of anal somite; antennula 10-segmented; antenna with very long seta representing exopodite; and second endopodite segment of the fourth swimming leg with one apical spine and one apical seta. This genus is, in our opinion, closest related to the genus *Allocyclops.* Many other genera from the subfamily Cyclopinae have similar segmentation of the swimming legs and antennula (*Speocyclops* Kiefer, 1937; *Muscocyclops* Kiefer, 1937; *Fimbricyclops* Reid, 1993; etc.), but the fusion of their fifth leg to somite is of completely different nature, and it is never total.

We divided the genus *Allocyclops* into 3 subgenera: *Allocyclops* s. str., *Psammocyclops* Kiefer, 1955, and *Stolonicyclops* Reid & Spooner, 1998. Their differential diagnoses, in our opinion, are not sufficient for giveng them generic status. This especially refers to the monospecific subgenus *Stolonicyclops,* which can be separated from the subgenus *Psammocyclops* only by the absence of the coxal setae. All other characteristics are at specific, not at generic level. We already pointed out that Kiefer (1955; 1956) very provisionally described *Psammocyclops excellens* as a new genus and new species. Even Pesce (1996) accepted this, without any particular comments. But if we believe in Kiefer's drawing of the female's fifth leg (which should be one separated article with three setae), how we can explain the drawing of the male's fifth leg (which is completely fused to the somite, and quite exact as the fifth leg in the genus *Allocyclops*)? It seems that Kiefer made an error and drew some cuticular suture or curve as a distinctive membrane of the fifth leg in the female. If we accept this, and after comparison of *Psammocyclops excellens* with *Allocyclops ritae* Dumont & Lamoot, 1978, we see that there are no differential characteristics between these two species. In their description Dumont & Lamoot (1978) wrote that *A. ritae* has the spine formula on exopodites of the swimming legs as 3.3.3.2. But reexamination of the type material (Rocha & Bjornberg 1988) showed that this formula is 2.3.3.2, i.e. the same formula as in *Psammocyclops excallens*. Shape of the fourth swimming leg, as well as dorsal view of the urosome, and other details are the same in both species. Only Dumont & Lamoot (1978) noted that separation of the segments of the fourth leg endopodite is hardly visible, but we already said that this characteristic is known as highly variable in many species. Therefore we consider *Allocyclops ritae* as a synonym of *Psammocyclops excellens*. It is probably trogloxen, or maybe a troglophilous species also in Madagascar, but Kiefer (1955, 1956) there collected only interstitial fauna.

Allocyclops montenegrinus, spec. nov. clearly belongs to the subgenus *Allocyclops*. In fact, in that subgenus there are two well distinguished groups of species. The first group contains three tropical species, having the innermost apical seta of the furcal rami longer than the outermost one. The other group to which *A. montenegrinus* belongs has the innermost apical seta shorter than the outermost one. All species of that group inhabit subterranean waters of Europe, except *A.* (s. str.) *arenicolous* which was known from the interstitial of Lake Nyasa (Africa). From all species in the subgenus *Allocyclops* the new species is easily distinguishable by the shape of furcal rami, anal operculum, and spine and setal formula on swimming legs. Very strong differential characteristics between species, as well as geographical distribution of the genus *Allocyclops,* tell us that this genus had the highest diversity during Tertiary or even before. The genus *Speocyclops,* on the other hand, has very weak differential characteristics between species, and it seems that this genus now has its highest diversity in subterranean waters of Europe. After transferring *Speocyclops transsaharicus* and *Speocyclops orcinus* from that genus to the genus *Allocyclops* (in this paper), many taxonomical and zoogeographical problems in that genus are resolved. The observations of some populations of *Speocyclops demetiensis* from surface waters in Norway by Hessen & Stene (1991) demonstrate that probably we do not need to search ancestors of that genus in African surface waters. Maybe they inhabited mosses and other surface waters on European high mountains before Quaternary major climatic oscillations.

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In diesem optisch sehr ansprechenden Bildband werden 1273 (!) Arten und Unterarten schalentragender Weichtiere aus dem Arabischen Golf und dem östlichen Arabischen Meer vorgestellt. Das Hauptgewicht liegt natürlich bei den artenreichen Gastropoden und Muscheln, es werden aber auch einige relevante Scaphopoden, Cephalopoden und Polyplacophoren behandelt. Zu (fast) jeder Art findet sich ein qualitativ hochwertiges Farbfoto, z.T. auch als prächtige Großaufnahme, ein kurzer und prägnanter Text zur Schalenmorphologie sowie Information zu Habitat und Verbreitung im Telegrammstil. Kleine Schalen werden meist als Zeichnungen oder, sehr anschaulich, als raster-elektronenmikroskopische Aufnahmen präsentiert. Sammlern und faunistisch Interessierten bietet sich so ein umfassendes Bestimmungs- und Nachschlagewerk arabischer Meeresweichtiere, in dem auch einige Klein- und Tiefwasserformen enthalten sind. Anspruch auf Vollständigkeit besteht verständlicherweise jedoch nicht.

Für die Zuverlässigkeit der Angaben und Artbestimmungen stehen vier namhafte Autoren mit langjähriger wissenschaftlicher Erfahrung und Leidenschaft. Ihre Recherchen schlossen aufwendige Vergleichsstudien an internationalen Museen sowie Expertisen zahlreicher Spezialisten mit ein. Taxonomische Anmerkungen oder Hinweise zur Synonymie sind jedoch bewußt knapp gehalten und nur in Kurzform an die Beschreibungen gefügt, auf Fachliteratur wird nur in Einzelfällen hingewiesen. Dies werden wissenschaftlich Interessierte sicherlich mehr bedauern als das Festhalten an einer traditionellen Großgruppeneinteilung.

Ihr selbst gestecktes Ziel "to provide a well-illustrated guide to most of the species of shell-bearing Mollusca living around the coasts of Oman and the Arabian Gulf ..." haben die Autoren jedenfalls bestens erfüllt und ein Standardwerk zu einem akzeptablen Preis geschaffen. M. Schrödl

3. Wallace, A.: The Origin of Animal Body Plan: A Study in Evolutionary Developmental Biology. – Cambridge University Press, Cambridge. 1997. xii + 338 pp. ISBN 0-521-55014-9 hbk.

In order to fulfill the promise of its title, the author has compiled data from various sources and disciplines including comparative developmental genetics, selection theory, population genetics, ecology, and phylogenetics. Indeed, the strength of this book lies in the comparative and interactive consideration of many different biological disciplines providing a nice example of what is called "reciprocal illumination".

However, the morphologist and phylogenetist feels bad in recognizing a general confusion of "body plan" (i.e. a compilation of characters shared by the majority of species of a taxon and thus a logic but purely idealistic subject) and "stem species" (i.e. the hypothetical, probabilistic reconstruction of a historical reality). Only the latter can and have to be explained, the former exists but in our minds alone. The same is true for ideas on the origin and evolution of life cycles, which are based on "characteristic" instead of ancestral larval types or life-cycle modes in the various taxa. Indeed, according to the given survey echinoderms, crustacean and molluscs alone show various larval types, and practically not a single, truly ancestral life-cycle of any higher taxon is presented.

Despite these shortcomings, which unfortunately can be found in many current contributions on developmental evolution, the book is recommended to everyone who is interested in the evolution of development and its underlying processes. G. Haszprunar

4. Flindt, R.: Biologie in Zahlen, eine Datensammlung in Tabellen mit über 10.000 Einzelwerten – Spektrum Akademischer Verlag, Heidelberg, 5. Auflage. 2000. 285 S. ISBN 3-8274-0914-4.

Ein unentbehrliches Nachschlagewerk, dessen Erfolg mit der in kurzer Zeit notwendig gewordenen 5. Auflage deutlich wird. Hier kann man schnell und einfach vergleichende Zahlen zu allen möglichen Fachgebieten der Biologie nachschlagen. Die Tabellen informieren unter anderm über zoologische, botanische, physiologische, genetische und zellbiologische Themen. Bei allen Tabellen sind die Originalquellen angegeben, über die man dann bei Bedarf genauere Information finden kann. Ein Nachschlagewerk, das in keiner guten Bibliothek fehlen sollte. K. Schönitzer

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The genus *Erophiloscia* Vandel, 1972 – its phylogeny and biogeography, with description of three new species

(Crustacea, Isopoda, Oniscidea)

Andreas Leistikow

Leistikow, A. (2001): The genus *Erophiloscia* Vandel, 1972 – its phylogeny and biogeography, with description of three new species (Crustacea, Isopoda, Oniscidea). – Spixiana **24/1:** 29-51

A reexamination of the type material of *Erophiloscia longistyla* Vandel, 1972 revealed the presence of a second species in Colombia within the type series. *E. waegelei,* spec. nov. is quite similar to the preceding species, but differs in the presence of a caudal row of spines onn the male pleopod 1 endopodite and a set of teeth in endopodite 2. Furthermore, there are two new species from a collection performed by Dr. W. Hanagarth at Panguana station in Peru in 1975/76: *E. recurvata,* spec. nov. which is characterized by the laterally bent male pleopods 1 and 2 and *E. acanthifera,* spec. nov. with some specific ornamentations on the male pleopod endopodite 1. The new records throw new light on the phylogenetic relationships of the species of this genus: The presence of a linea frontalis on the cephalothorax is considered a plesiomorphy of *E. longistyla* and *E. waegelei,* whereas the reduction of the caudomedial row of spines on the male pleopod 1 endopodite is a synapomorphy of *E. longistyla, E. recurvata,* and *E. acanthifera.* The Peruvian species are adelphotaxa due to the lack of a linea frontalis. The genus is found in the valleys of the northern Andes, which have a tropical climate. It is close to several genera forming the monophyletic *Prosekia*-group. A key for the four species is presented.

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Introduction

The genus *Erophiloscia* Vandel, 1972 was instituted for one new species of terrestrial isopods from Colombia (Vandel 1972), namely *Erophiloscia longistyla* Vandel, 1972. In addition, two species from Ecuador, first ascribed to the genus *Andenoniscus* Verhoeff, 1941 (Vandel 1968) were included. These two species were superficially described solely on the basis of female specimens, and a recognition of the males of these species is not warranted. Particularly since the descriptions were superficial and focused on characters commonly found in other species, they were regarded as nomina dubia by Leistikow (1998a) until new material, particularly males, are found.

Nonetheless, this genus is rather distinct from other South American genera of "philosciid" Oniscidea, especially the shape of pleopod 5 is unique within the Crinochaeta of this continent. A similarly shaped pleopod 5 can be found among others in *Chaetophiloscia hastata* Verhoeff, 1929. At the first glance, one should consider these forms congeneric. For elucidating the phylogenetic relationships of

Erophiloscia, the type material was re-examined and within this material, a new species could be located. Other material was found in the collection which Dr. W. Hanagarth made in the 1970's in Peru. The first material described was those of the genus *Ischioscia* Verhoeff, 1928 (Schmalfuss 1980). Now some more information on the interesting isopod fauna of the Biological station "Panguana" shall be given: the examination of the collection revealed the presence of two new species of the genus *Erophiloscia*.

The new species are described in detail and their phylogenetic relationships are discussed. Type specimens are deposited in Muséum National d'Histoire Naturelle, Paris (MNHN) and in Staatliches Museum für Naturkunde, Stuttgart (SMNS).

Systematic account

Genus *Erophiloscia* Vandel, 1972

Diagnosis. Cephalothorax with linea supra-antennalis, linea frontalis present or lacking, small lateral lobes, profrons with two slight depressions above antennal sockets, eyes composed of about 5 to 10 ommatidia. Antennula three-articulate, distal joint with two divergent aesthetasc tufts, the distal one directed more prominent than the vertical one, antenna with three-articulate flagellum, bearing a long apical organ.

Mandibular penicil consisting of about 4-7 branches, medial endite of maxillula without apical tip, lateral endite with 4+6 teeth, five of inner set cleft, outer lobe of maxilla up to two times broader than inner lobe, maxilliped with palp bearing two setal tufts, endite with small penicil, lacking setation.

Pereopods with sparse setation, ornamental sensory spine of carpus 1 double-fringed serrate, coxal plates with long nodulus lateralis, nodulus lateralis on coxal plate IV inserted more dorsally.

Pleopods without respiratory areas on exopodites, endopodites 1 and 2 of male elongate, especially of pleopod 2, reaching or somewhat surpassing caudal tip of pleotelson. Pleopod 5 exopodites of males, mediodistally drawn out, as for supporting pleopod 2 endopodites.

Uropod protopodite with lateral groove, endopodite inserting proximally of exopodite.

Type species. *Erophiloscia longistyla* Vandel, 1972 (by original designation)

Remark. This interesting genus is at once distinguished from other South American members of the "*Prosekia*-group", which have a synapomorphic morphology of the antennula as discussed elsewhere (Leistikow 1998a), by the shape of the male pleopods, especially the drawn out pleopod 5 exopodites and the extraordinarily long pleopod 2 endopodites already noted by Vandel (1972), a conspicuous set of autapomorphies. The pleopod 5 exopodite bears no guide slot for the pleopod 2 endopodite, which is holded simply by the medial margin of the exopodite 5. This character and the lack of a proximal setal tuft on the palp of the maxilliped and of setation on the endite are synapomorpies of the species of *Erophiloscia*. The closest relatives of *Erophiloscia* are the members of *Prosekia* Leistikow, 2000 and *Xiphoniscus* Vandel, 1968 which have a synapomorphic structure of the antennula. Rather closely related is *Andenoniscus* Verhoeff, 1941, with the noduli laterales extraordinarily long.

Erophiloscia waegelei, spec. nov.

Figs 1-6

Erophiloscia longistyla Vandel, 1972 (part).

Types. Holotype, ♂, 2.5 mm, several paratypes: Colombia, montane forest near Tibabitá, under tree mosses, 2600 m-2800 m, leg. H. Sturm, 18.07.1969, MNHN Vandel Collection.

Note. Among the plentiful material of *Erophiloscia longistyla* Vandel, 1972 there was found a lot with the males differing remarkably from the type. They are somewhat smaller and show differences in the morphology of the male pleopods.

Description

Colour. Material somewhat faded.

Cephalothorax. Linea frontalis faint, most significant medially from compound eyes, continued by lateral lobes, linea supra-antennalis present, faint lamina frontalis, compound eyes consisting of about 8 ommatidia (Fig. 1, Ctf).

Pereon. Tegument smooth with scattered tricorn-like setae, coxal plates (Fig. 6 Cx3) with sulcus marginalis and nodulus lateralis, nodulus on coxal plate IV inserted more distantly from the lateral margin (Fig. 1, Cxp), gland pores lacking.

Pleon. Retracted from pereon, neopleurae of pleonites 3 to 5 small, pleotelson with almost straight lateral margins, bearing scattered tricorn-like setae (Fig. 6, Tel).

Antennula. Three-articulate with prominent proximal article, distal joint bulbous, bearing two distinct sets of aesthetascs (Fig. 1, An1).

Antenna. Antennal peduncle composed of five articles with length ratio 1:2:2:3:4, densely covered with tricorn-like setae, flagellum composed of three articles, distal one bearing prominent apical organ, as long as flagellar articles 1 and 2 together (Fig. 1, An2).

Mandible. Molar penicil composed of about seven branches, pars intermedia with two penicils on left and one on right mandible, additional plumose seta more proximally (Fig. 2, Mdl/r).

Maxillula. Medial endite with two pointed penicils, no apical tip, lateral endite with apically 4+5 teeth, four of inner set cleft, laterally fringed (Fig. 2, Mx1).

Maxilla. Lateral lobe almost twice as broad as medial one, almost without setation, medial endite bearing some cusps apically (Fig. 2, Mx2).

Maxilliped. Basipodite with sulcus lateralis, palp with two setal tufts, proximal one consisting of three setae, endite without setation, bearing two teeth caudally; in examined specimen, rostral surface with transverse scar at level where knob-like penicil inserted, probably broken (Fig. 2, Mxp).

Pereopods. Rather slender (Fig. 3, PE1-4, 4, PE5-7), carpus of pereopod 1 with small antenna-grooming brush rostrally, ornamental sensory spine double-fringed serrate (Fig. 3, Sc1), prominent sensory spines with two subapical tips, dactylus with short inner claw, dactylar seta simple (Fig. 3, Dac).

Pleopods. Shape of exopodites rhomboidal, laterally bearing two to six sensory spines, exopodite 5 with transverse row of long pectinate setae on caudal surface (Fig. 5, PL1-5).

Sexual dimorphism. Male ischium of pereopod 7 with fewer spines on medial margin than female Male pleopod 1 exopodite circular, endopodite styliform, with longitudinal ridge on rostral surface, subapically with slight transverse furrows rostrally, producing a striate appearance, mediocaudally with longitudinal row of spines. Male pleopod 2 exopodite pointed, lateral margin sinuous with three sensory spines subapically, endopodite conspicuously surpassing exopodite, flagelliform, distal quarter with several hyaline, obtuse hooks, medioproximally directed. Even female endopodite mediodistally pointed. Male pleopod 5 exopodite mediocaudally pointed, protrusion of one fifth the length of medial margin.

Uropod. As described in generic diagnosis (Fig. 4, UR).

Genital papilla. Ventral shield coniform with almost parallel margins, mouths of ductus ejaculatorii distinctly longer than ventral shield (Fig. 5, Gen).

Etymology. The new species is dedicated to Prof. Dr. J. W. Wägele for his merits to isopodology and molecular phylogenetic systematics.

Remark. As described above, the new species was found among the samples of *Erophiloscia longistyla*, which was collected at several sites in Colombia. Both species resemble each other, but they can be determined by the male pleopods as follows: pleopod 1 endopodite of *E. waegelei*, spec. nov. less pointed than in *E. longistyla*, with transverse furrows subapically and caudomedial row of spines (Fig. 7; PL1-2). Both characters may represent plesiomorphies as regards the ground pattern of the genus, they are lacking in *E. longistyla*, which has a mediocaudal row of hyaline lobes delimiting the spermatic channel. In contrast to the relations in pleopod 1, the endopodite of pleopod 2 in *E. waegelei* is the more derived: the obtuse hyaline hooks near the apex are not found in any other species and are an apomorphic feature of this appendage. In pleopod 5 the protrusion is longer in *E. longistyla*. Thus, it can be concluded that in this species the endopodite 2 is longer than in *E. waegelei* because it certainly works as a supporting structure for the endopodite 2.

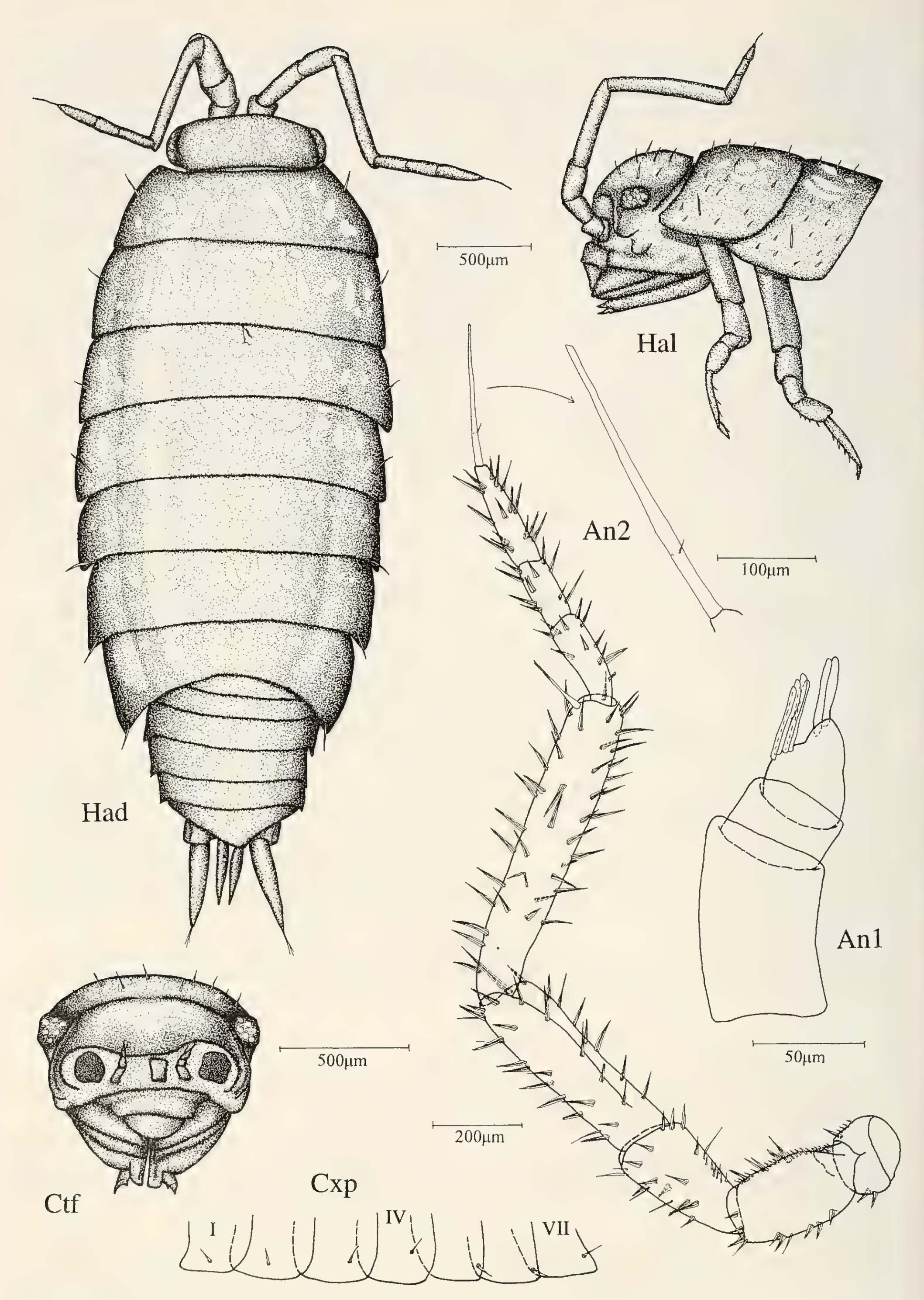


Fig. 1. *Erophiloscia waegelei* spec. nov. Holotype male. An1: antennula; An2: antenna with detail of apical organ; Ctf: cephalothorax in frontal view; Cxp: coxal plates with position of noduli laterales; Had: habitus in dorsal view; Hal: habitus in lateral view.

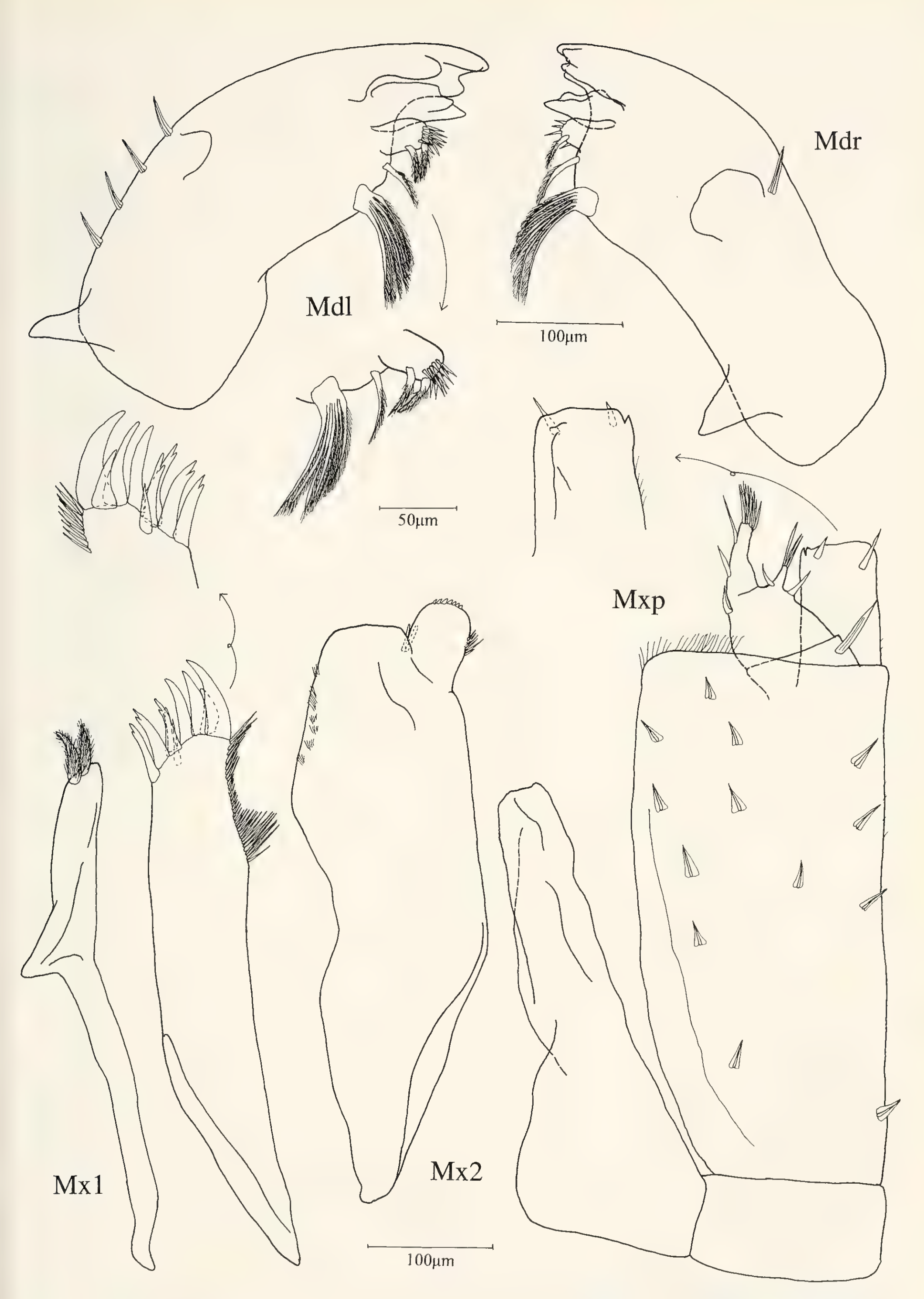


Fig. 2. *Erophiloscia waegelei*, spec. nov. Holotype male. Mdl: left mandible, with detail of pars intermedia; Mdr: right mandible; Mxp: maxilliped with detail of endite in rostral view; Mx1: maxillula with detail of apex of lateral endite in caudal view; Mx2: maxilla.

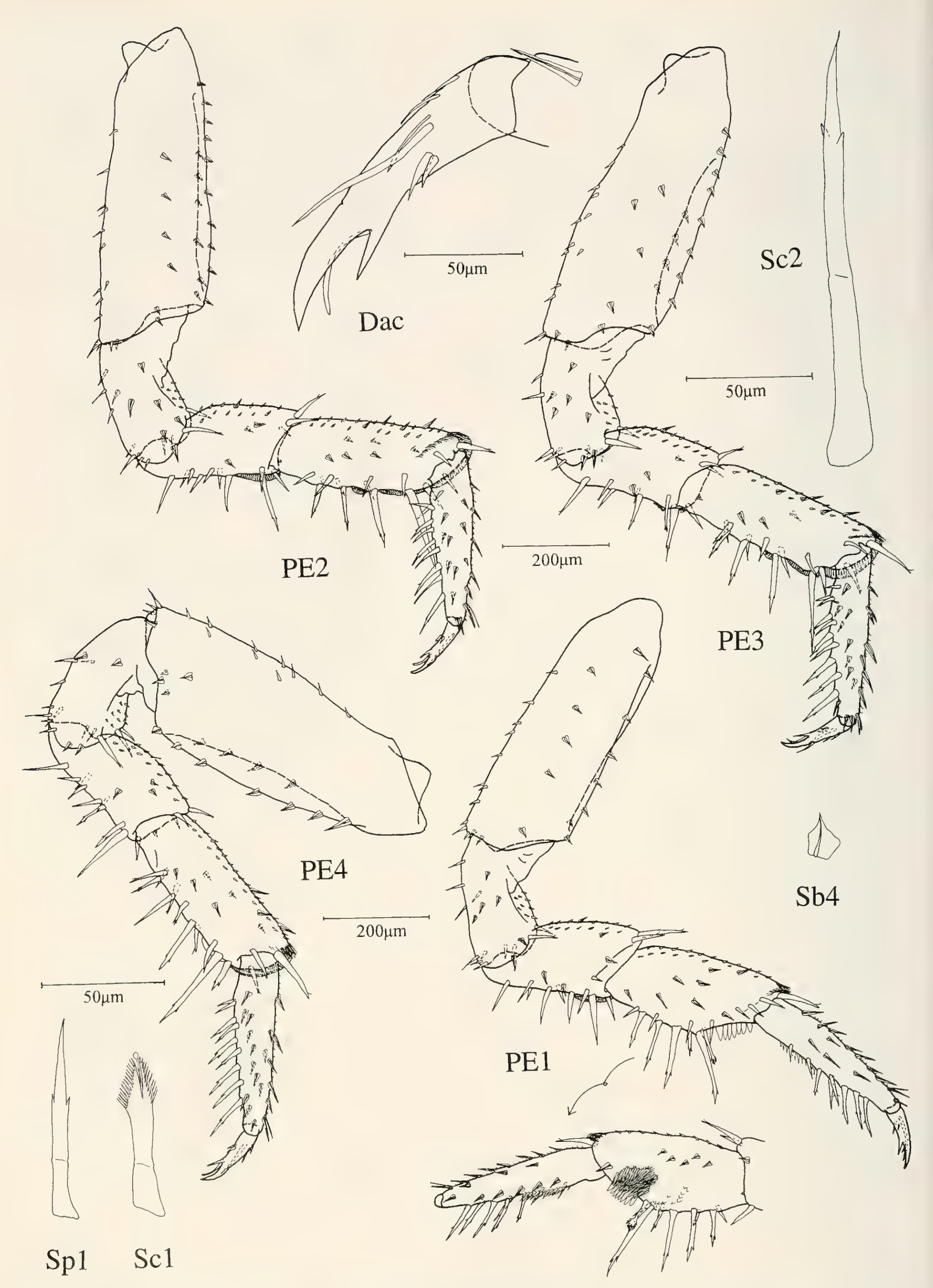


Fig. 3. *Erophiloscia waegelei*, spec. nov. Holotype male. Dac: dactylus 3 in rostral view; PE1-4: pereopods 1-4 (caudal view), with detail of carpus 1 in rostral view; Sb4: tricorn-like seta of basis 4; Sc1: ornamental sensory spine of carpus 1; Sc2: longest sensory spine of carpus 2; Sp1: distal sensory spine of propus 1.

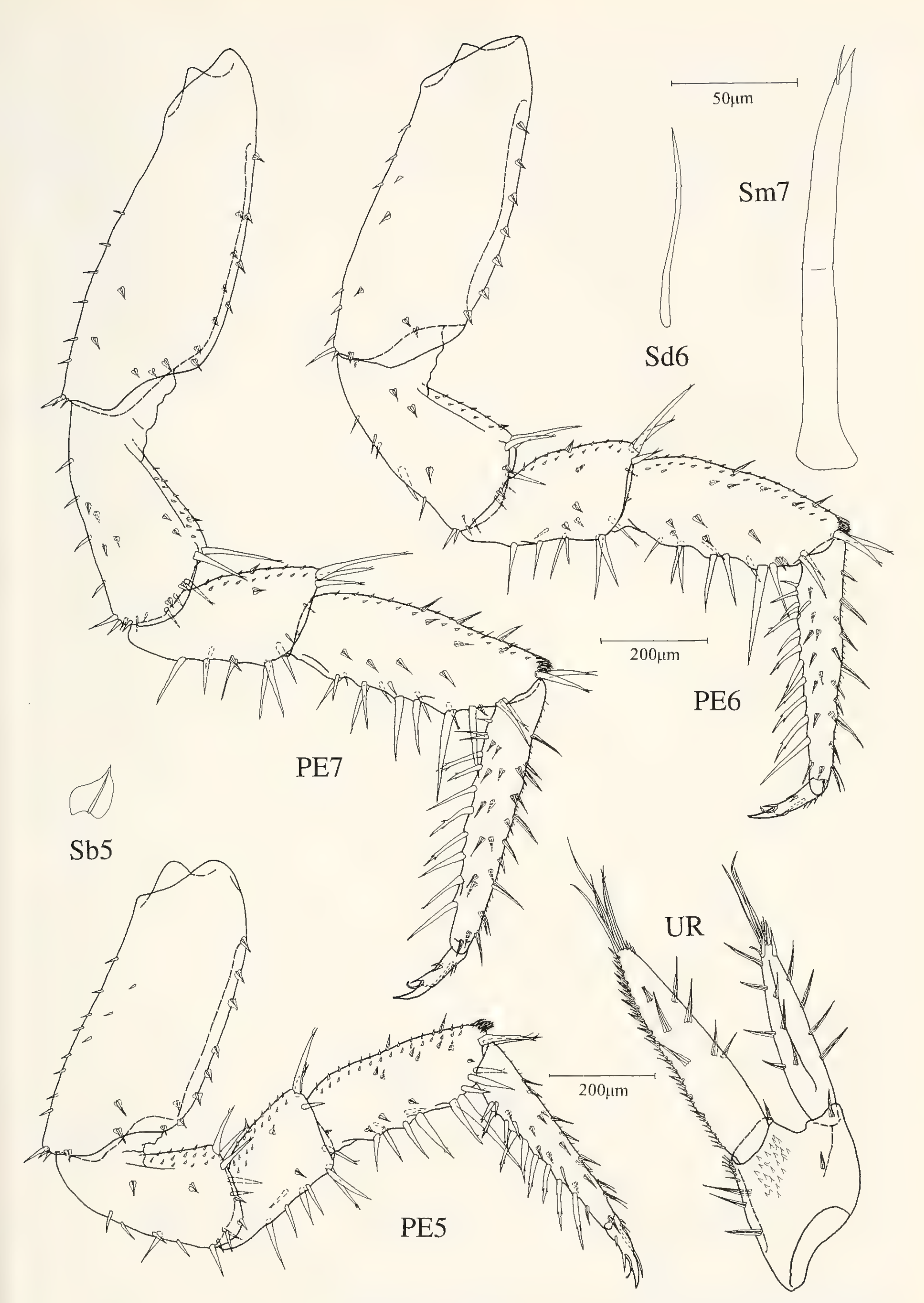


Fig. 4. *Erophiloscia waegelei,* spec. nov. Holotype male. PE5-7: pereopods 5-7 (caudal view); Sb5: tricorn-like seta of basis 5; Sd6: dactylar seta of dactylus 6; Sm7: sensory spine of merus 7; UR: uropod.

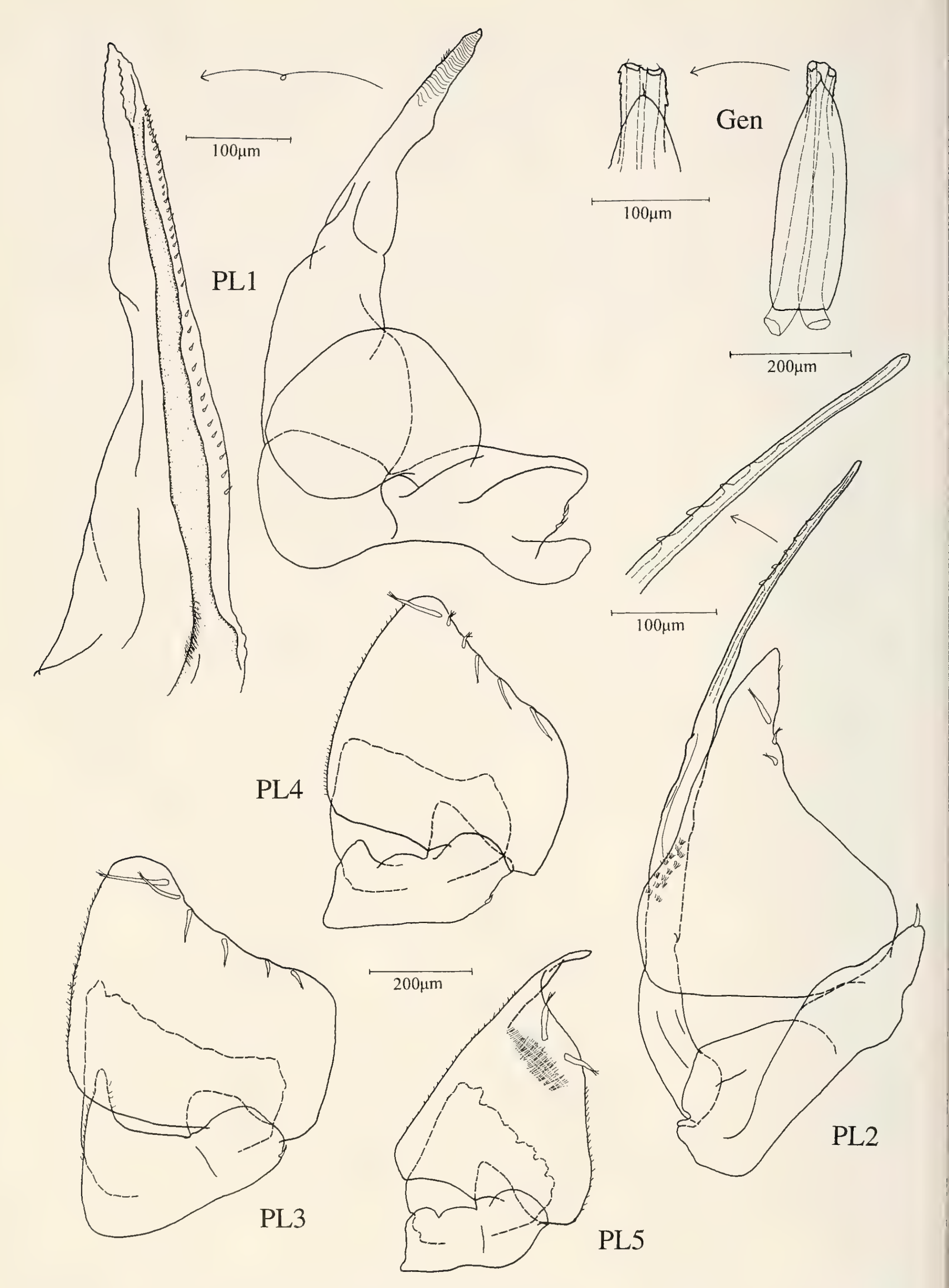


Fig. 5. *Erophiloscia waegelei,* spec. nov. Holotype male. Gen: genital papilla, with detail of apex; PL1-5: pleopods 1-5, rostral view, with details of endopodite 1 in caudal view; endopodite 2 in rostral view.

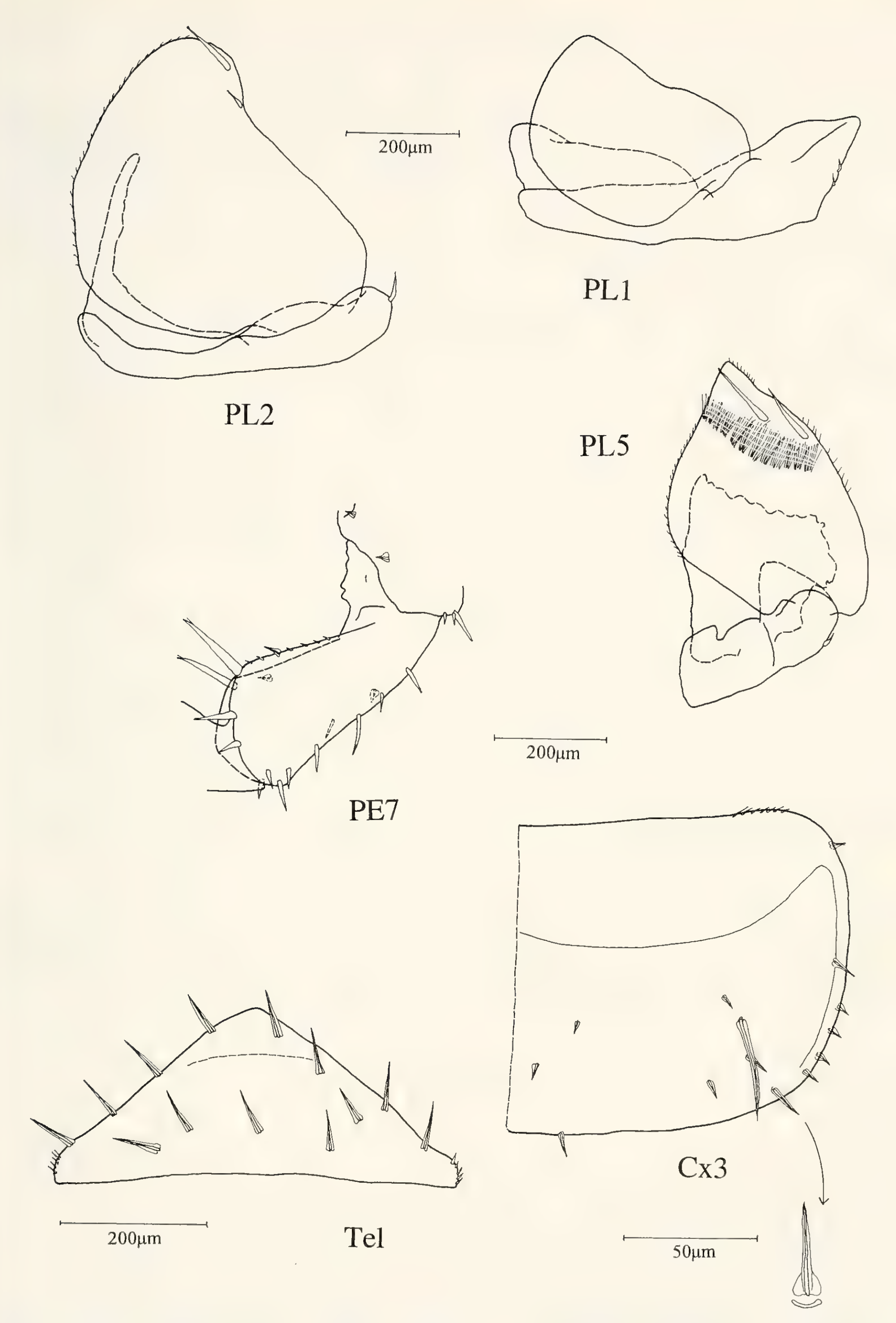


Fig. 6. *Erophiloscia waegelei*, spec. nov. Paratype female. Cx3: coxal plate 3 with detail of nodulus lateralis; PE7: ischum of perepod 7; PL1-5: pleopod 1, 2, 5 in rostral view; Tel: pleotelson.

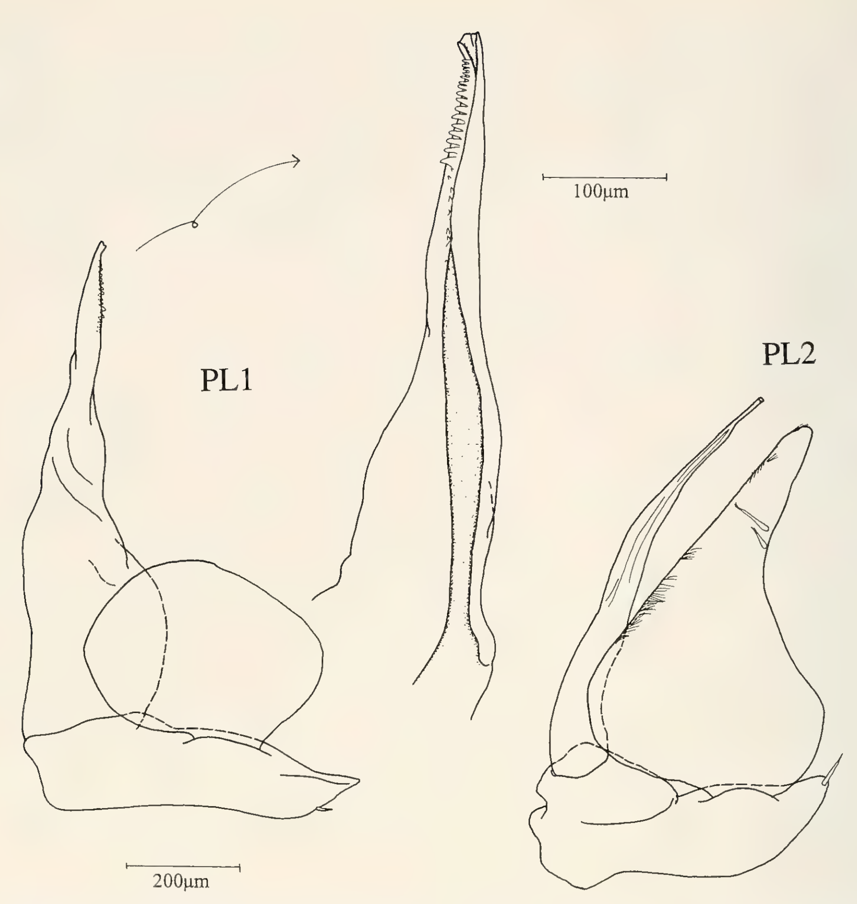


Fig. 7. *Erophiloscia longistyla* Vandel, 1972. Paratype male. PL1-2: pleopods 1-2, rostral view, with detail of endopodite 1 in caudal and mediorostral view.

E. waegelei, spec. nov. is the most basal form of this genus in several aspects of cephalothorax morphology: the linea frontalis is rather distinctive, especially medial from the compound eyes, and a faint lamina frontalis is present, both characters belonging to the ground pattern of a taxon within the crinochaete Oniscidea comprising most of the known species.

Erophiloscia longistyla Vandel, 1972

Fig 7

Vandel, 1972:   .

Types. Lectotype: microscopic slides of ♂: Colombia, Bogotá, above calle 71, montane forest, leaf litter, 2750 m a.s.l. Leg. H. Sturm, 14.02.1969, MNHN Vandel Collection

Remark. This species was described by Vandel (1972) and is well documented. For comparison with *E. waegelei*, spec. nov., the male pleopods 1 and 2 are figured (Fig. 7, PL1-2). The male pleopod 1 endopodite lacks the caudomedial row of spines, it is pointed, bearing transverse lamellae at its distal part. Male pleopod 2 endopodite elongate, more than three times longer than pointed exopodite which bears about 4 sensory spines laterally near its apex.

Erophiloscia recurvata, spec. nov.

Figs 8-11

Types. Holotype: ♂, 3 mm, Peru, Dept. Huanuco; Distr. Puerto Inca, Rio Yuyapichis, Biological station "Panguana" 9°37'S 74°56'W, altitude 250 m, Maniokfeld, 12.-27.XII 1975 leg. W. Hanagarth (SNMS coll. T439). – Paratypes: 2♂♂, 9♀♀, 2 juv, max. 3.5 mm, same data as holotype (SMNS coll. T440); 2♂♂, 3♀♀ max. 2.5 mm, Cocha, X.1975-I.1976, leg. W. Hanagarth (SMNS coll. T441).

Description

Colour. Reddish brown with several white spots on the tergites, pleon without light markings, cephalothorax dorsally with white spots.

Cephalothorax. Linea frontalis lacking, linea supra-antennalis and lamina frontalis present, small lateral lobes, compound eyes consisiting of seven ommatidia (Fig. 8, Ctf).

Pereon. Tegument smooth and shiny, coxal plates lacking gland pores and sulcus marginalis, noduli laterales present, long and flagelliform, on coxal plate IV more distantly from lateral margin (Fig. 8, Cxp).

Pleon. Retracted from pereon, neopleurae visible, pleotelson with rounded distal margin, bearing some tricorn-like setae (Fig. 8, Tel).

Antennula. Three-articulate, rather stout with distal article bearing prominent tuft of aesthetascs medially and 2 aesthetascs apically (Fig. 8, An1).

Antenna. Comparatively slender, length ratio of peduncular articles 1 to 5 1:2:2:4:5, flagellum three-articulate with articles subequal in length, distal article slightly longer, as long as apical organ (Fig. 8, An2).

Mandible. Pars molaris consisting of a four-branched molar penicil, pars intermedia bearing two penicils on left and one on right mandible, intermedial penicil slender (Fig. 9, Mdl/r).

Maxillula. Medial endite bearing two penicils apically, no additional tip discernible. Lateral endite with 4+4 teeth, inner set cleft (Fig. 9, Mx1).

Maxilla. Lateral lobe two times broader than medial one, bearing scattered trichiform setae and pectinate scales, medial endite apically with 8 cusps (Fig. 9, Mx2).

Maxilliped. Basipodite with short sulcus lateralis, palp with one seta on proximal article, endite with small knob-like penicil rostrally and two strong teeth caudally (Fig. 9, Mxp).

Pereopods. Rather similar to the preceding species (Fig. 10, PE1-7), dactylus with short inner claw and flagelliform dactylar seta (Fig. 10, Dac).

Pleopods. Exopodites rather prominent, bearing laterally 1 to 4 sensory spines, endopodites with two lobes (Fig. 11, PL1-5).

Sexual dimorphism. Male pereopod 7 ischium bearing only one sensory spine laterally instead of two in the female. Male pleopod 1 exopodite small, rounded, endopodite long and slender, at halflength bent laterally and apex turned caudally, row of small spines reduced, medial border of spermatic furrow crenulate near apex (Fig. 11, PL1). Male pleopod 2 exopodite triangular with one sensory spine laterally, endopodite slender, bent laterally (Fig. 11, PL2). Male pleopod 5 exopodite with long protrusion of mediodistal edge, decurved laterally for holding the similarly shaped endopodite 2 (Fig. 11, PL5).

Uropod. As in generic diagnosis.

Genital papilla. Ventral shield ovate, ductus ejaculatorii not surpassing apex of ventral shield (Fig. 11, Gen).

Etymology. The species name "*recurvata*" is latin and means incurved, i.e. the shape of the male copulatory devices bent laterally.

Remark. This species is more derived with respect to the lack of a linea frontalis and a well accentuated lamina frontalis, yet *Erophiloscia recurvata*, spec. nov. is a typical member of its genus with elongate pleopod 2 endopodite and prolonged tip of pleopod 5 exopodite in the male. The peculiar form of the male endopodite 1 and the laterally bent distal half of all the copulatory devices are unique among its congeners. Similar to the other species of *Erophiloscia* save *E. waegelei*, spec. nov., the mediocaudal row of spines on the endopodite 1 is reduced.

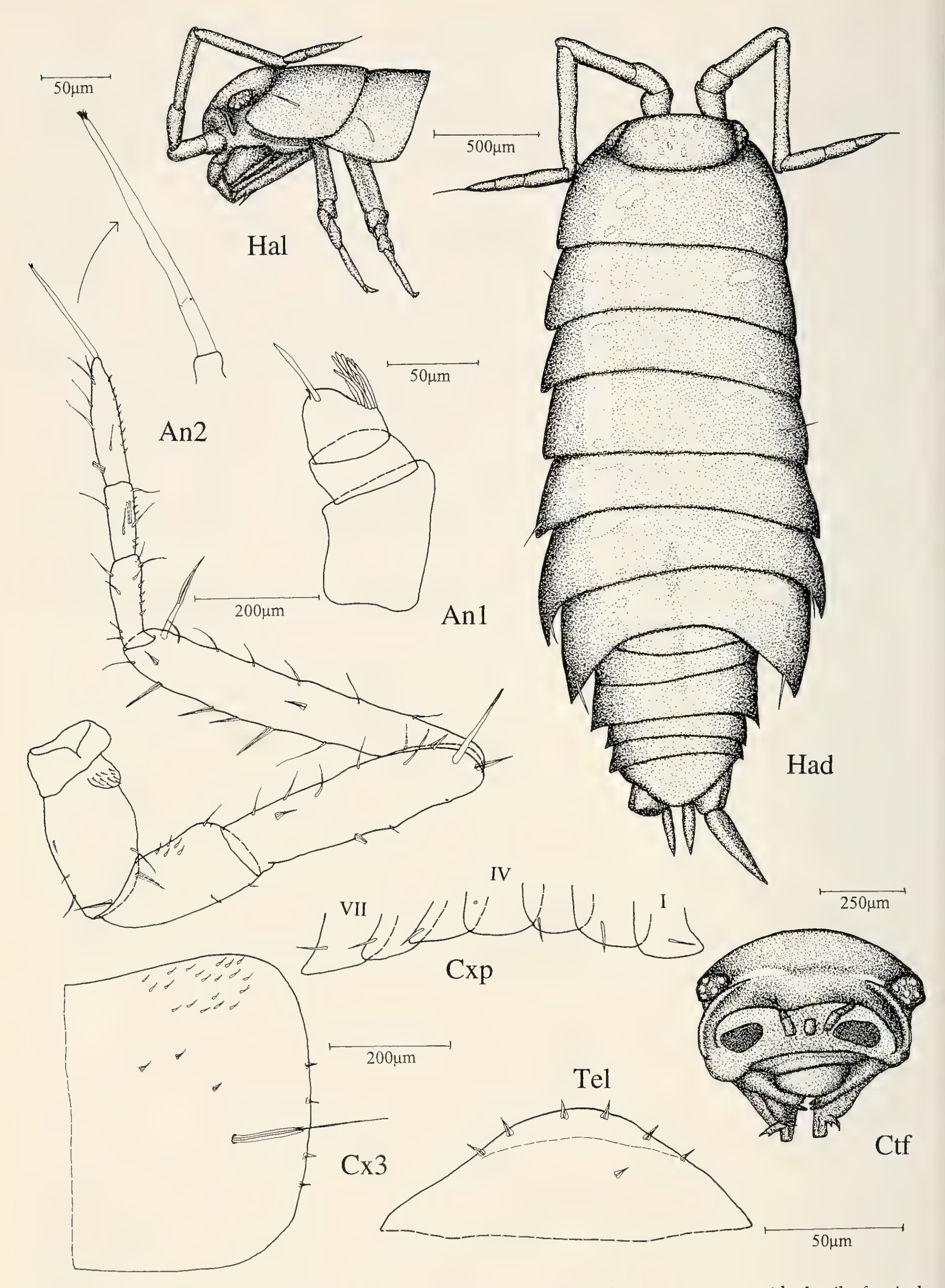


Fig. 8. *Erophiloscia recurvata*, spec. nov. Holotype male. An1: antennula; An2: antenna with detail of apical organ; Ctf: cephalothorax in frontal view; Cxp: coxal plates with position of noduli laterales; Cx3: coxal plate 3; Had: habitus in dorsal view; Hal: habitus in lateral view; Tel: pleotelson.

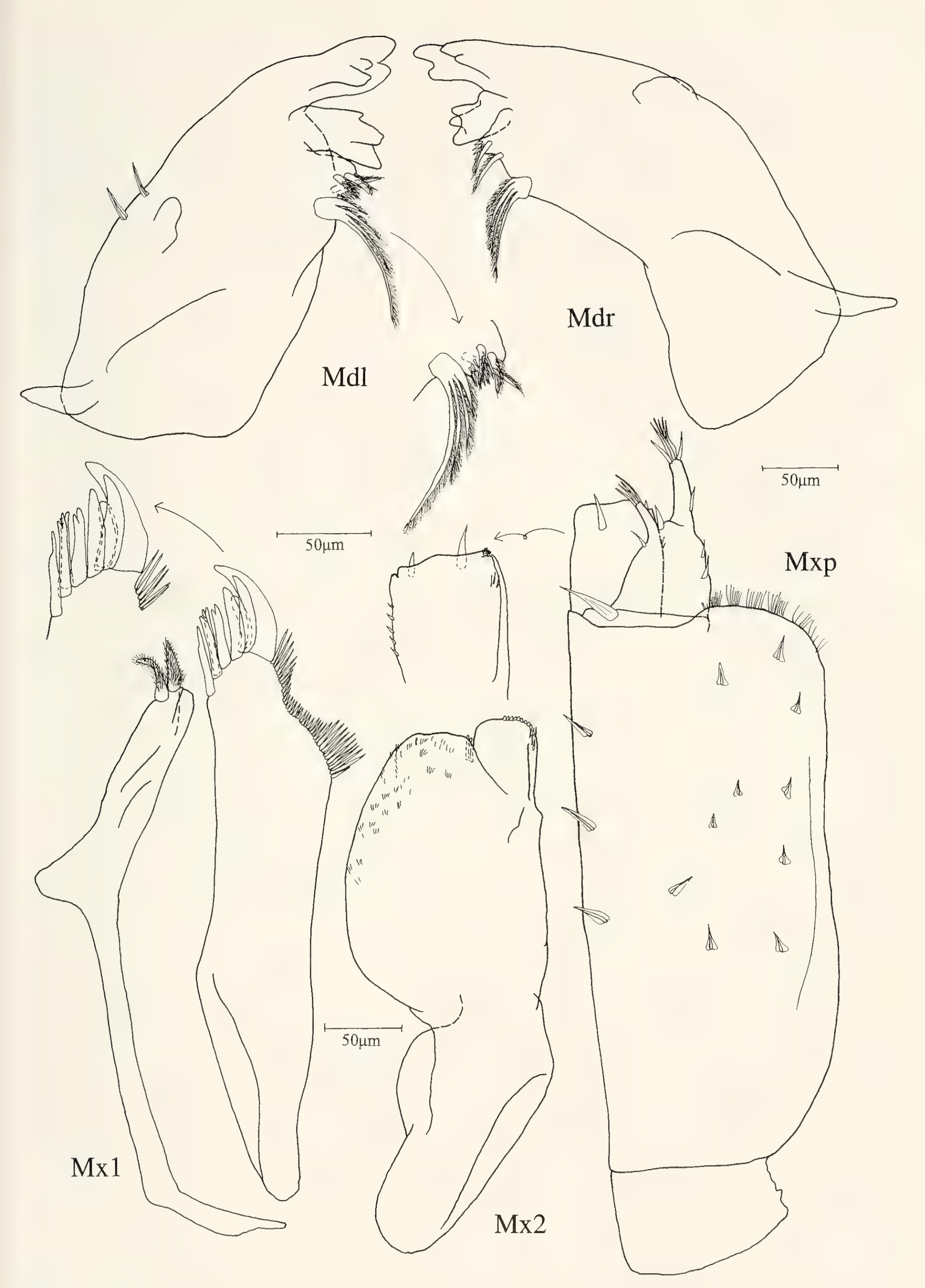


Fig. 9. *Erophiloscia recurvata*, spec. nov. Holotype male. Mdl: left mandible, with detail of pars intermedia; Mdr: right mandible; Mxp: maxilliped with detail of endite in rostral view; Mx1: maxillula with detail of apex of lateral endite in caudal view; Mx2: maxillula.

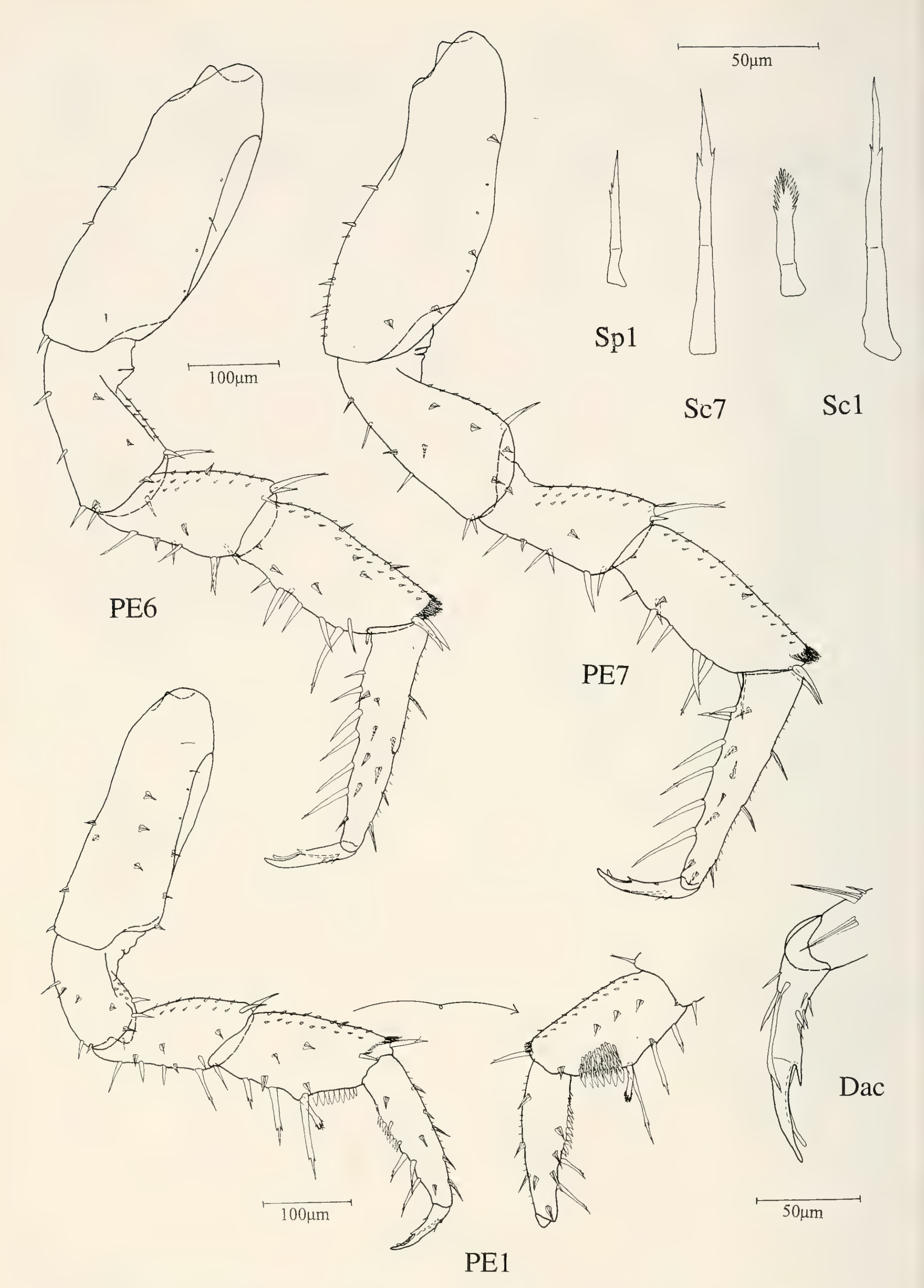


Fig. 10. *Erophiloscia recurvata*, spec. nov. Holotype male. Dac: dactylus 1 in rostral view; PE1-7: pereopods 1, 6, 7 in caudal view, with detail of carpus 1 in rostral view; Sc1: ornamental and longest sensory spine of carpus 1; Sc7: sensory spine of carpus 7; Sp1: distal sensory spine of propus 1.

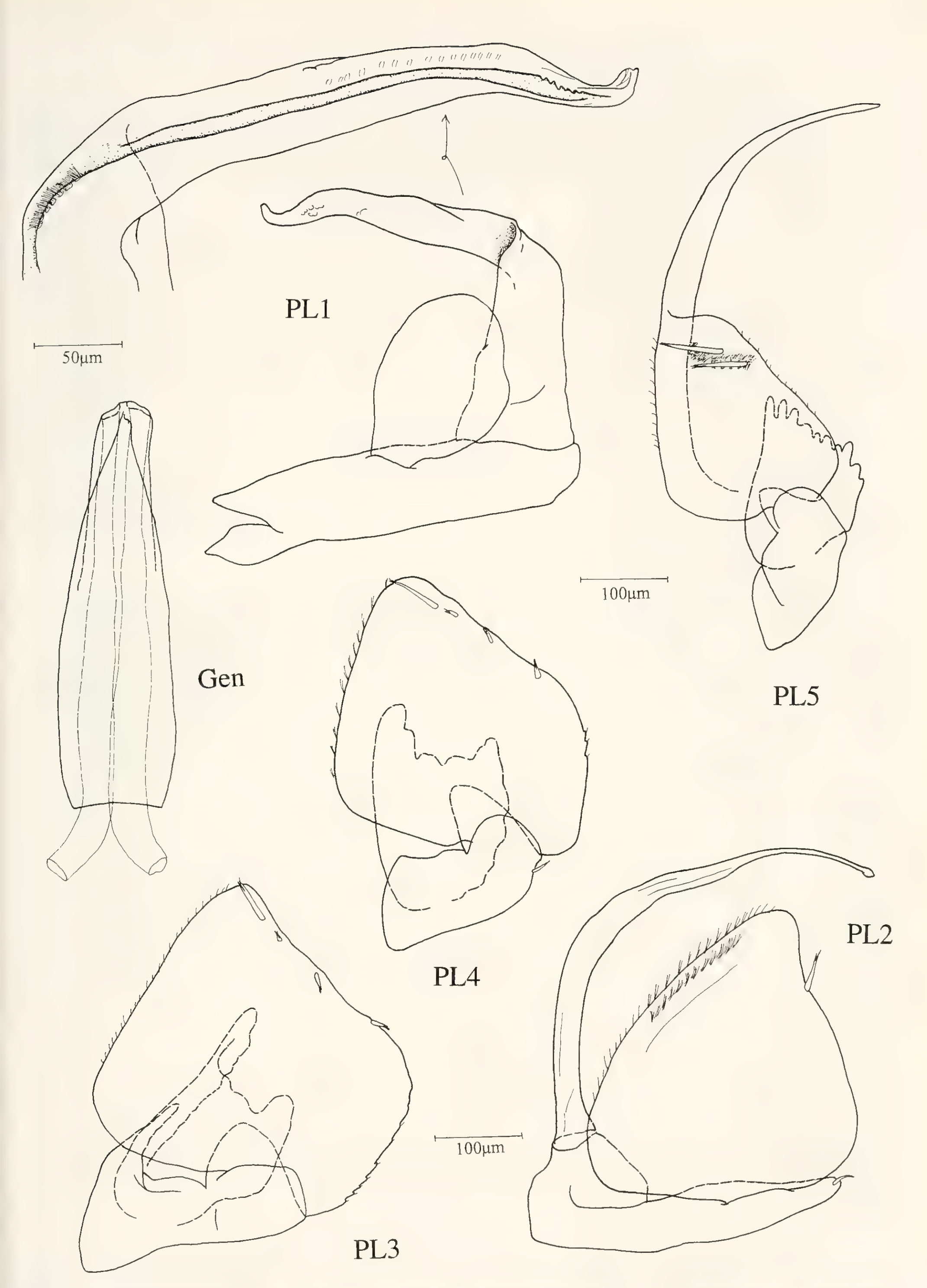


Fig. 11. *Erophiloscia recurvata,* spec. nov. Holotype male. Gen: genital papilla; PL1-5: pleopods 1-5, rostral view, with details of endopodite 1 in caudal view.

Erophiloscia acanthifera, spec. nov.
Figs 12-16

Types. Holotype: ♂, 4 mm, Peru, Dept. Huanuco; Distr. Puerto Inca, Rio Yuyapichis, Biological station "Panguana" 9°37'S 74°56'W, altitude 250 m, "A3" leg. W. Hanagarth (SMNS coll. T442). – Paratypes: 2♂♂, 5♀♀, 1 juv., max. 4 mm, same data as holotype (SMNS coll. T443); 4♂♂ 2.5-4 mm, A2, 1.XII.1975 leg. W. Hanagarth (SMNS coll. T444); 2♂♂, 27♀♀, 3 juv., max 3.5 mm, Wald, X-XI.1975 leg. W. Hanagarth (SMNS coll. T445).

Description

Colour. Dorsally purplish brown with several prominent white spots on tergites, pereonites 5 to 7 with white medial band, continued on pleonite 1, ventrally whitish.

Cephalothorax. Linea and lamina frontalis lacking, linea supra-antennalis and small lateral lobes present, compound eyes consisting of about 7 ommatidia (Fig. 12, Hal).

Pereon. Tegument smooth and shiny, coxal plates with sulcus marginalis and long flagelliform nodulus lateralis, nodulus lateralis of coxal plate IV inserting more disatantly from lateral margin (Fig. 12, Cxp).

Pleon. Retracted from pereon, rather slender, neopleurae very small, pleotelson with almost straight margins, bearing several tricorn-like setae (Fig. 12, Tel).

Antennula. As in generic diagnosis, medial tuft of aesthetascs consisting of a fewer number than in other species (Fig. 12, An1).

Antenna. Rather short, peduncular articles 4 and 5 shorter than in preceding species, flagellum three-articulate, distal article two times longer than proximal article, apical organ longer than distal article (Fig. 12, An2).

Mandible. Similar to preceding species (Fig. 13, Mdl/r).

Maxillula. Medial endite with two penicils and apical tip, lateral endite bearing 4+5 teeth, four of inner set cleft, the other one short, lateral fringe of trichiform setae stepped (Fig. 13, Mx1).

Maxilla. Lateral lobe slightly broader than medial one, lacking setation, medial lobe with about 10 cusps apically (Fig. 13, Mx2).

Maxilliped. Basipodite with sulcus lateralis, palp with two setal tufts apically, proximal article bearing two setae, endite with small knob-like penicil rostrally and prominent tooth caudally (Fig. 13, Mxp).

Pereopods. Slender (Fig. 14, PE1-4, 15, PE5-7), carpus and propus of pereopod 1 with antenna-grooming brush, ornamental sensory spine of carpus 1 double-fringed serrate (Fig. 14 Sc1), dactylus with short inner claw and interungual seta, dactylar seta simple (Fig. 14, Sd3).

Pleopods. Exopodites rather prominent, bearing 5-6 lateral sensory spines in pleopod 3 and 4, pleopod 5 exopodite triangular, endopodites more or less bilobate (Fig. 16, PL1-5).

Sexual dimorphism. Pereopods ithout sexual dimorphism. Male pleopod 1 exopodite circular, small, endopodite slender, spermatic furrow distinctly bordered only on lateral side, apex with rectangular protrusion, terminated by a proximally directed thorn (Fig. 16, PL1). Pleopod 2 exopodite similar to preceding species, endopodite extraordinary long, flagelliform, surpassing exopodite more than two times (Fig. 16, PL2). Therefore, pleopod 5 exopodite strongly drawn out for holding pleopod 2 endopodite (Fig. 16, PL5).

Uropod. As in generic diagnosis (Fig. 15, UR).

Genital papilla. Similar to the preceding species (Fig. 16, Gen).

Etymology. The species name is composed of the greek term "*acanthos*", which is "thorn" or "hook" and the latin verb "*ferre*", meaning "to bear", related to the hook on the apex of pleopod 1 endopodite.

Remark. Similar to the preceding species, *Erophiloscia acanthifera*, spec. nov. lacks a linea frontalis and a lamina frontalis. It is best recognised by the shape of the male pleopod 1 endopodites with their hook-bearing apices, looking like a pair of pliers.

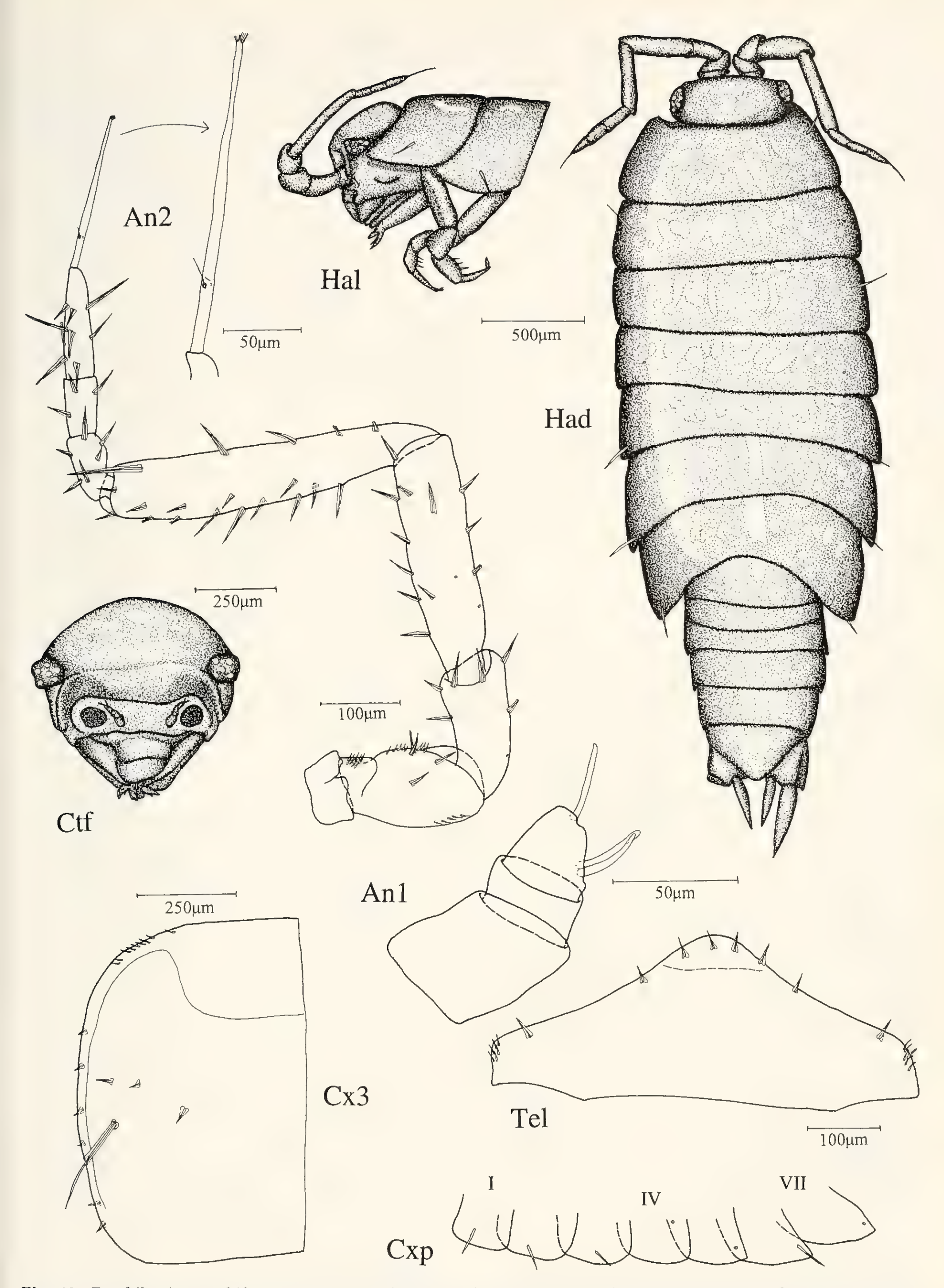


Fig. 12. *Erophiloscia acanthifera*, spec. nov. Holotype male. An1: antennula; An2: antenna with detail of apical organ; Ctf: cephalothorax in frontal view; Cxp; coxal plates with position of noduli laterales; Cx3: coxal plate 3; Had: habitus in dorsal view; Hal: habitus in lateral view; Tel: pleotelson.

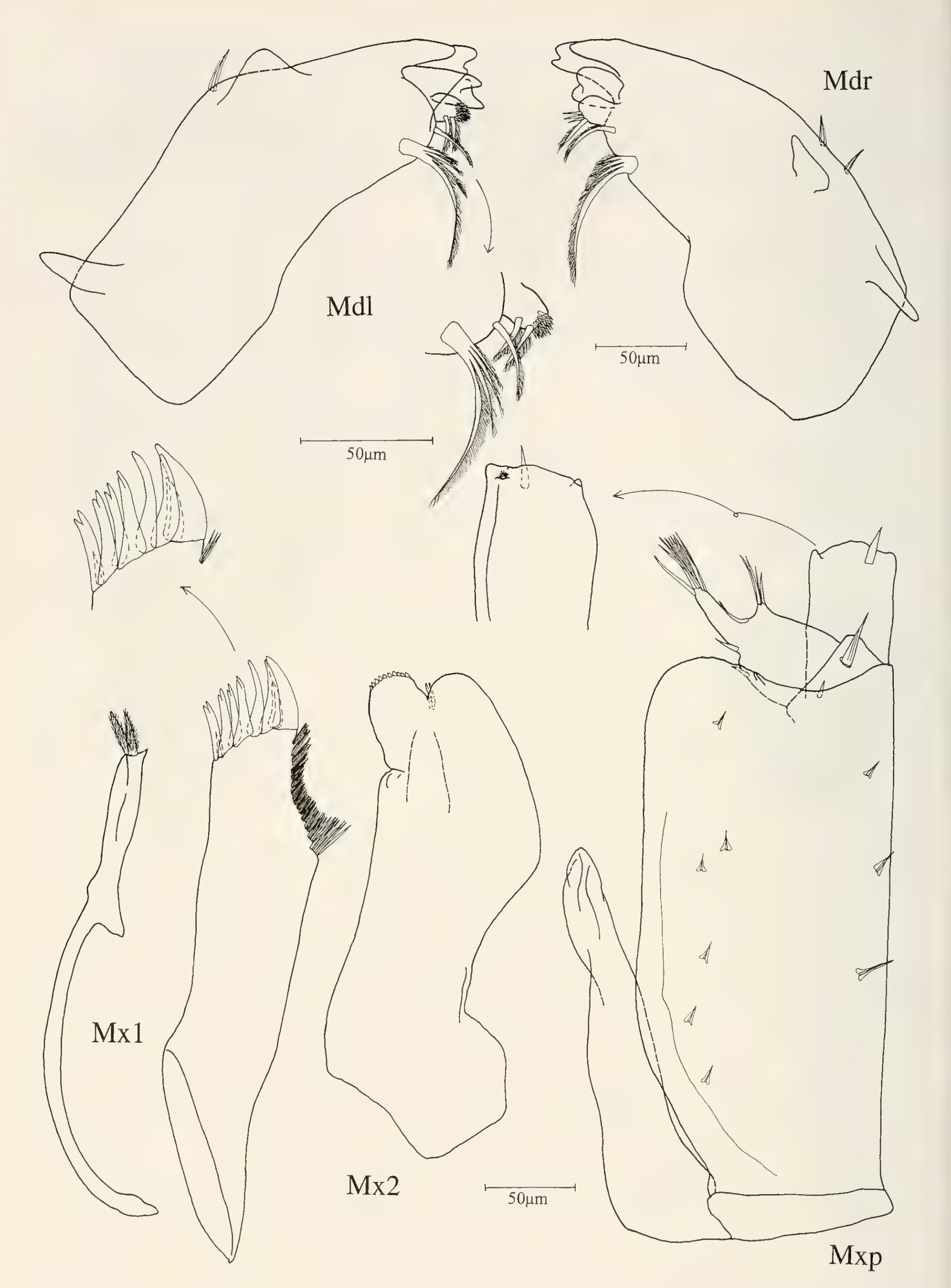


Fig. 13. *Erophiloscia acanthifera*, spec. nov. Holotype male. Mdl: left mandible, with detail of pars intermedia; Mdr: right mandible; Mxp: maxilliped with detail of endite in rostral view; Mx1: maxillula with detail of apex of lateral endite in rostral view; Mx2: maxilla.

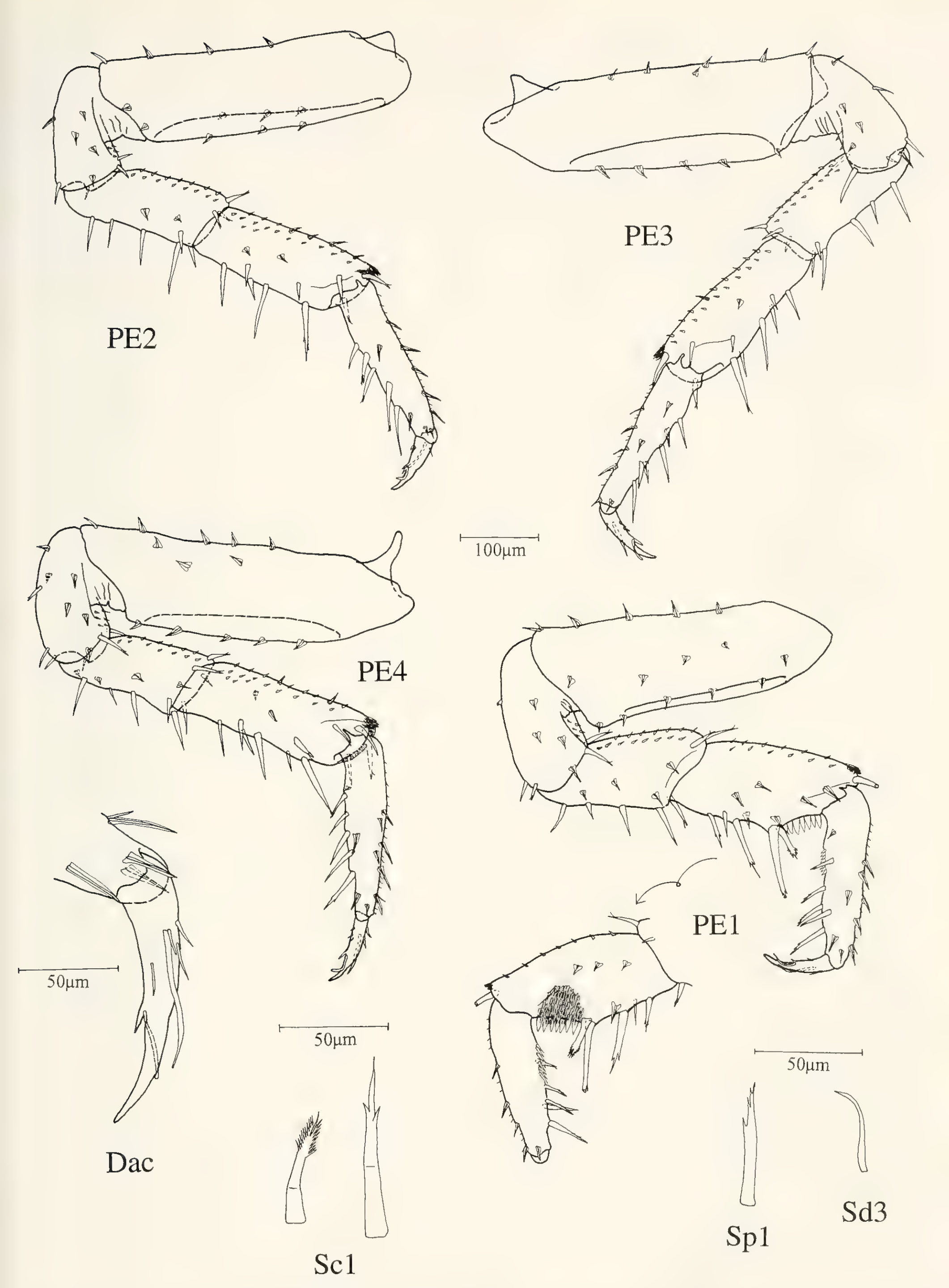


Fig. 14. *Erophiloscia acanthifera*, spec. nov. Holotype male. Dac: dactylus 1 in rostral view; PE1-4: pereopods 1-4 in caudal view, with detail of carpus 1 in rostral view; Sc1: ornamental sensory and second longest sensory spine of carpus 1; Sd3: dactylar seta of dactylus 3; Sp1: distal sensory spine of propus 1.

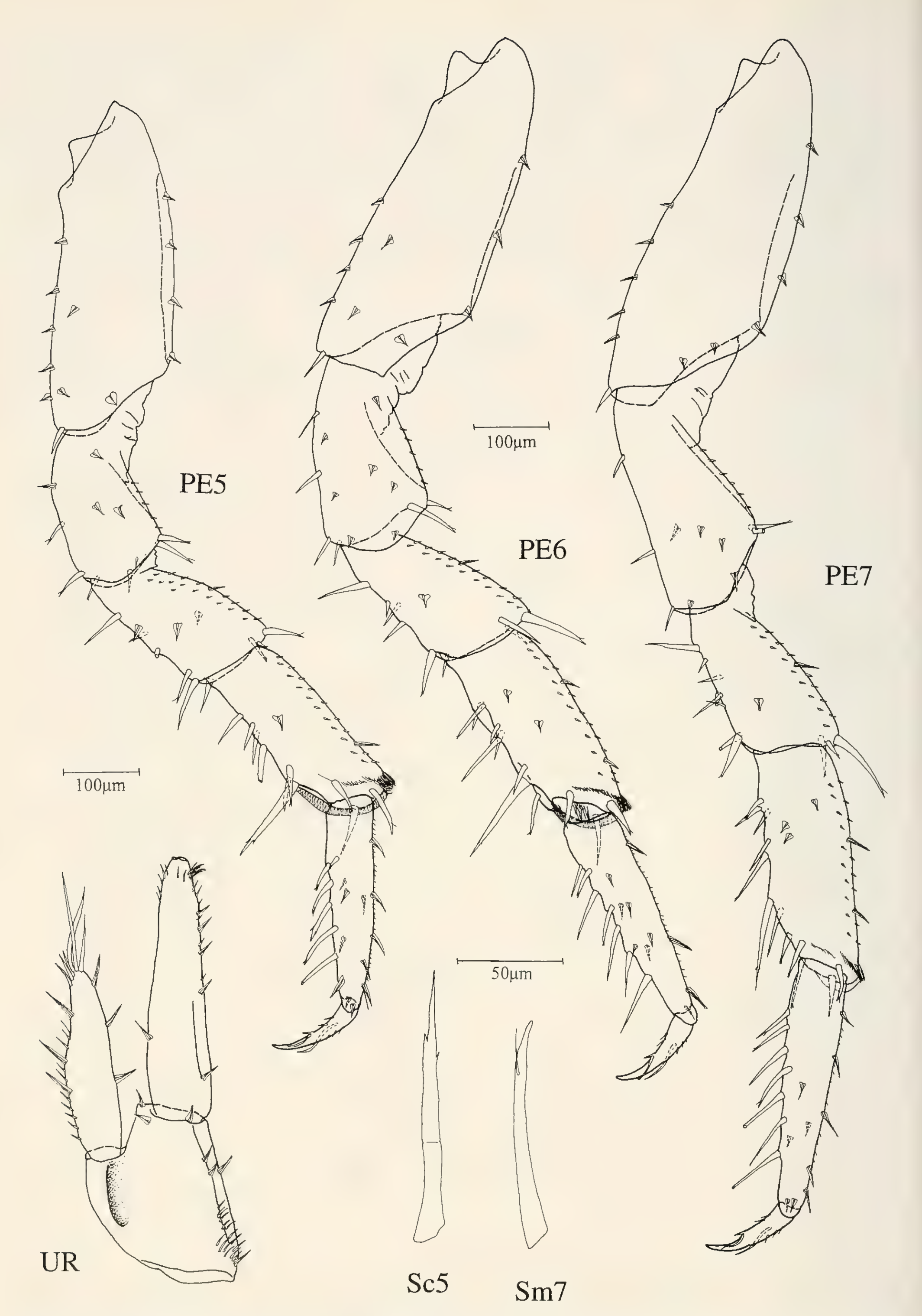


Fig. 15. *Erophiloscia acanthifera*, spec. nov. Holotype male. PE5-7: pereopods 5-7 in caudal view; Sc5: sensory spine of carpus 5; Sm7: sensory spine of merus 7; UR: uropod in rostral view.

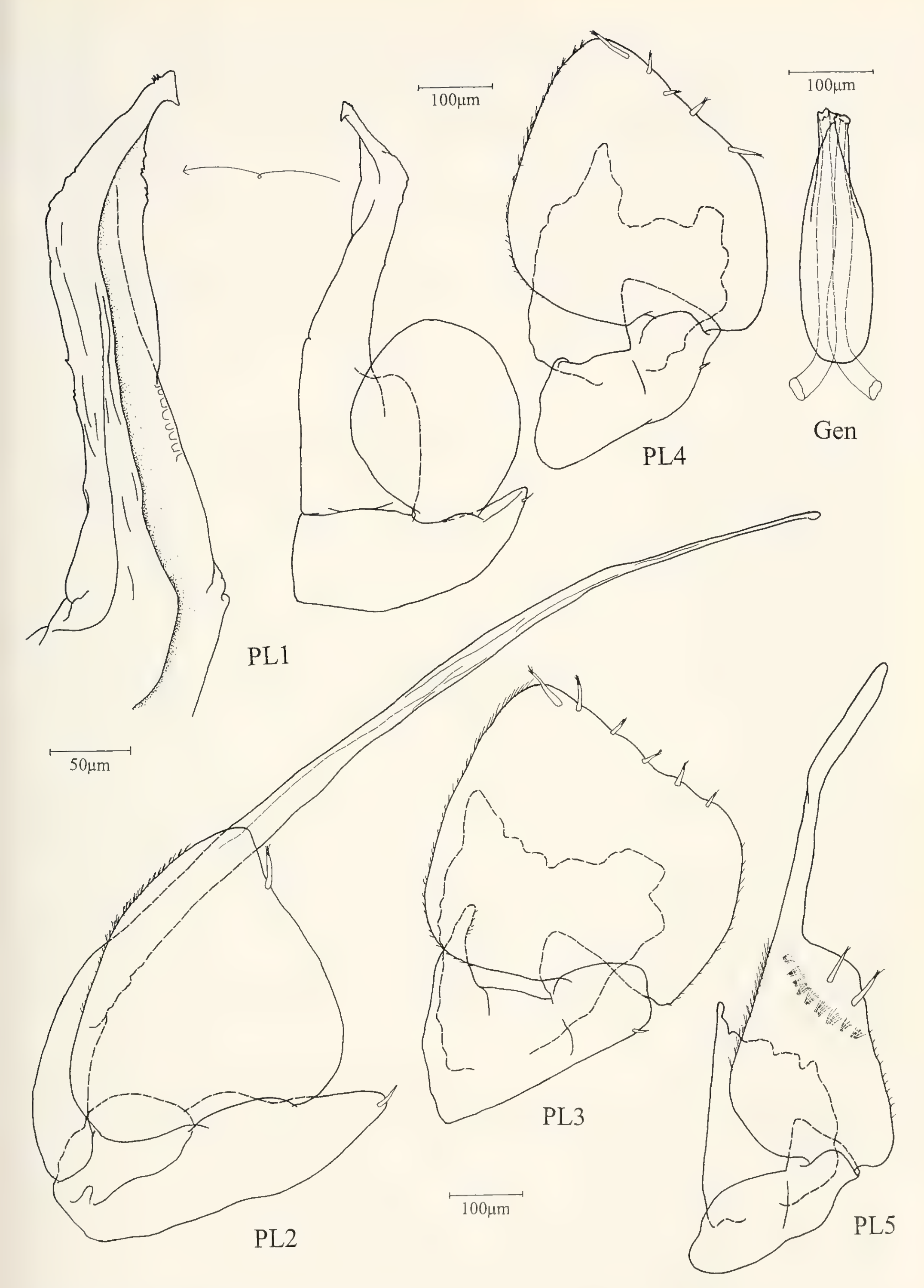


Fig. 16. *Erophiloscia acanthifera*, spec. nov. Holotype male. Gen: genital papilla; PL1-5: pleopods 1-5, rostral view, with details of endopodite 1 in caudal view.

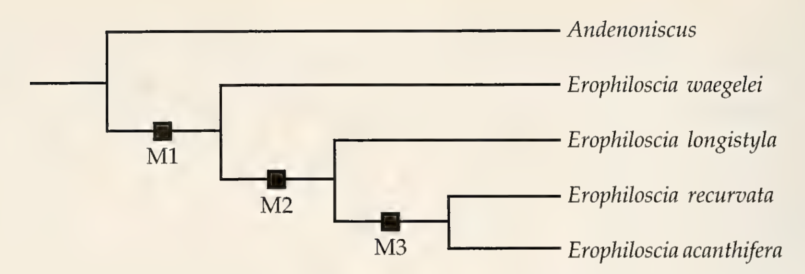


Fig. 17. Phylogenetic relationships within the genus *Erophiloscia* Vandel, 1972. M1: male pleopod 5 extraordinarily drawn out, no guide slot [male pleopod 5 subtrinagular without distal extension]. M2: caudal row of spines on male pleopod 1 endopodite reduced [caudal row of spines present]. M3: linea frontalis reduced [linea frontalis present].

Phylogeny and Biogeography

The genus *Erophiloscia* Vandel, 1972 is one of several small "philosciid" genera of the Andean region. Its closest relatives are the genera *Andenoniscus* Verhoeff, 1941, *Xiphoniscus* Vandel, 1968 and a hitherto undescribed genus from Peru, Venezuela and Amazonian Brazil. All these genera are characterized by the presence of long, flagelliform noduli laterales, with the fourth inserted more distantly from the lateral margin, the antennula with divergent sets of aesthetascs and the small size with compound eyes composed of about 6 to 8 ommatidia. Vandel (1972) stated that the long male pleopod 1 endopodite is a character of generic importance – an autapomorphy of *Erophiloscia* – but this is only partially true. It is comparatively slender. It is the pleopod 2 endopodite which is long and flagelliform. It may reach caudally beyond the pleotelson. To protect this copulatory device, the medial margin of pleopod 5 exopodite is straight and distally drawn out, holding the endopodite 2 ventrally on this enlargement. In *Erophiloscia recurvata*, the mediodistal extension of exopodite 5 is as bent laterally as the pleopod 2 endopodite. The specific structure of the male pleopod 5 exopodite is an autapomorphy of the genus Erophilosica (Fig. 17, character M1). In contrast to Vandel's (1972) statement, half of its species has pleopod 1 endopodites of unspectacular length. Superficially the structure of pleopod 5 exopodite resembles the one of several species of *Chaetophiloscia* Verhoeff, 1908, or *Natalscia longistylata* Ferrara & Taiti, 1985, but the fine structure is different: *Chaetophiloscia* has a guide slot caudally for the endopodite 1 resembling the one described by Legrand (1946). This structure is missing in *Erophiloscia*. These genera differ in other characters, too: the shape of the antennula, the shape of the ornamental sensory spine of the carpus 1, the shape of the noduli laterales as can be evidenced from the redefinition of *Chaetophiloscia* by Schmalfuß (1990).

In the ground plan of *Erophiloscia*, the linea frontalis and lamina frontalis is present, as is the row of small spines on the male pleopod 1 endopodite. They have subsequently been reduced in all species save *E. waegelei*. In all the other species, the caudal row of spines on pleopod 1 endopodite is reduced (Fig. 17, character M2). The type species, *E. longistyla* is the sister species of an adelphotaxon composed of *E. recurvata* and *E. acanthifera*. The latter have in common a three-tipped distal sensory spine on carpus 1, the linea frontalis completely reduced, no hyaline lobes on the male pleopod 1 endopodite (Fig. 17, character set M3).

The two most derived species live in the eastern slopes of the Andes in Peru. The area of distribution of their common ancestor and of *E. longistyla* might be fragmented by the uplift of the Andes in the Tertiary (e.g. Simpson & Haffer 1978). Since *E. recurvata* and *E. acanthifera* now occur sympatrically, their distributional ranges now overlap due to dispersal once speciation had happened. The distribution of several small philosciids like *Andenoniscus* and *Xiphoniscus* within the Andes is, biogeographically spoken, not "Andean". The Andean subregion is restricted to the higher parts of the mountain ranges, the Paramó zone. This area has stong affinities to the temperate southern South America (Morrone 1992). As can be evidenced from their distributional data (Vandel 1968, 1972, Verhoeff 1941), they are found in the tropical to subtropical lowlands. These tropical lowlands are part of the Neotropical realm. This neotropical distribution is not surprising, since their closest relatives, the members of *Prosekia*-group are distributed in the Amazon basin and Venezuela. Further collections in the intervening area will most probably reveal more records or even undescribed species of this genus.

Leistikow (1998b) reported to some material ascribed to *Pentoniscus pruinosus* Richardson, 1913 from Costa Rica as a possible undescribed species of *Erophiloscia*. There is some evidence that this species could belong to a closely related new genus which is distributed from the Amazon basin north to Guatemala (pers. obs.). From our point of knowledge, *Erophiloscia* is purely East-Andean in distribution, thus occurring in the westernmost parts of the Amazonian biogeographic subregion.

Key to the species

1. Linea frontalis present .... 2.
– Linea frontalis reduced .... 3.
2. Male pleopod 1 endopodite with caudal row of spines, endopodite 2 with some hooks near the apex .... *E. waegelei*, spec. nov.
– Male pleopod 1 endopodite without caudal row of spines, endopodite 2 without hooks near the apex .... *E. longistyla* Vandel
3. Male pleopod 1 and 2 endopodites and 5 exopodite strongly bent laterally .... *E. recurvata*, spec. nov.
– Male pleopods straight, endopodites 1 plier-like .... *E. acanthifera*, spec. nov.

Acknowledgements

The author thanks Dr. H. Dalens, Université de Toulouse, for the loan of the material, the permission to dissect a specimen and the critical review of the manuscript. He is indebted to Dr. H. Schmalfuss, Staatliches Museum für Naturkunde for the possibility to examine and describe the species of the Hanagarth collection and Prof. Dr. J. W. Wägele for his support of this investigation and the possibility to discuss on this work. For manuscript revision he also is grateful to Dr. A. Ohlers and Dr. S. Taiti.

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Dieser ausgesprochen benutzerfreundliche und informative Katalog behandelt die Nematoceren (Mücken) des Australischen Kontinents einschließlich der Lord Howe Insel, Norfolk Insel, Cocos Inseln, Christmas Insel, Ashmore and Cartier Inseln, Macquarie Insel, Heard und McDonald Inseln, und des autralischen Teils der Antarktis. Für die aus diesem Bereich bekannten Arten bietet er nicht nur alle wünschenswerten taxonomischen Angaben (Stand: Ende Dezember 1997), sondern auch kurze Angaben zur geographischen Verbreitung und Ökologie, oft auch weiterführende Literaturzitate.

Für jede Familie gibt es eine kleine Einführung mit Angaben zu Trivialnamen, typischen Merkmalen der Imagines und Larven, Biologie, Verbreitung und Taxonomie, einer charakteristischen, leicht stilisierten Zeichnung, und ein paar generellen Literaturhinweisen. Bei den spezifischen Angaben sind in der üblichen Weise innerhalb der Unterfamilien und Triben die Gattungen, und innerhalb dieser die Arten, alphabetisch geordnet. Synonyme für Gattungen und Arten sind in chronologischer Reihenfolge aufgelistet. Für jeden der verfügbaren Gattungs- und Artnamen (auch für die Synonyme) ist an Ort und Stelle das vollständige Zitat der Erstveröffentlichung angegeben, sowie das Typusmaterial, sein Aufbewahrungsort, und der Locus typicus. Für taxonomische Entscheidungen, z.B. Synonymisierungen, wird ebenfalls das vollständige Zitat mit Angabe der betreffenden Seite angeführt. Die geopraphische Verbreitung wird für Arten immer angegeben, für Gattungen nur insofern sie über die Grenzen des Katalogs hinausgeht. Schließlich folgen für jede Art ein paar Schlagworte zur Ökologie, teilweise auch umfangreichere Angaben, und manchmal noch eine weiterführende Literaturangabe. Trotz der vielen detaillierten Literaturzitaten und der von taxonomischen Katalogen üblicherweise nicht zu erwartenden Zusatzinformationen zur Ökologie, bleibt das fest gebundene Buch als solches vom Umfang her noch schön stabil und handlich.

Drei weitere Dipteren-Bände sind geplant, die Brachycera, Cyclorrhapha: Lonchopteroidea bis Brauloidea, und Cyclorrhapha: Muscoidea, behandeln sollen.

M. Kotrba

6. Detzel, P.: Die Heuschrecken Baden-Württembergs. – Ulmer Verl., Stuttgart, 1998. 580 S., 222 Farbfotos, 132 Verbreitungskarten, 137 Grafiken, 51 Tabellen. ISBN 3-8001-3507-8.

Mit dem vorliegenden Band ist dem Autor unter Mithilfe zahlreicher weiterer namhafter Spezialisten auf dem Gebiet der Orthopterologie ein sehr umfangreiches Standardwerk gelungen.

Der erste allgemeine Teil des Buches befaßt sich mit Nomenklatur, Zoogeographie, Biologie, Ökologie und den Lebensräumen von Heuschrecken. Im zweiten, speziellen Teil werden 70 einheimische Heuschreckenarten (Ensifera und Caelifera) sowie die in Baden-Württemberg einheimische *Mantis religiosa* ausführlich dargestellt. Für jede der Arten steht ein eigenes Kapitel mit kurzer morphologischer Beschreibung sowie ihrer Verbreitung in Eurasien, Deutschland und Baden-Württemberg inkl. Verbreitungskarten. Desweiteren findet man bei den Einzelartbeschreibungen ausführliche Erläuterungen zur Biologie (Nahrungs- und Fortpflanzungsbiologie) und zur Ökologie, ihren Gefährdungsstatus (Rote Liste Baden-Württemberg und naturräumliche Rote Liste) mit Hinweisen zu Schutz- und Pflegemaßnahmen.

Für jeden Heuschreckenkundler ist dieses Buch besonders auch deshalb sehr wertvoll, weil es neben einem umfangreichen Literatur- und Quellenverzeichnis zahlreiche Literaturhinweise zu allen angeführten Themen bietet. Außerdem besticht es durch seine klare, übersichtliche Gliederung, wodurch es für Fachleute bereits zu einem beliebten Nachschlagwerk geworden ist. Das Buch kann aufgrund seiner leicht verständlichen Darstellungsweise, aufgelockert durch viele schöne Abbildungen, gleichermaßen interessierten Laien empfohlen werden. Trotz der Spezialisierung auf die baden-württembergische Heuschreckenfauna ist das Werk über die Grenzen Baden-Württembergs hinaus interessant, da nur wenige, der in Deutschland autochthonen Arten, wie auf den Alpenraum beschränkte Spezies *(Aeropus sibiricus, Bryodema tuberculata, Epacromius tergestinus, Chorthippus pullus, Pholidoptera aptera, Tetrix tuerki)* bzw. ausgesprochene Steppenarten *(Arcyptera microptera, Gampsocleis glabra, Platycleis montana, Stenobothrus crassipes)* oder die lokal beschränkte *Tettigonia caudata* nicht näher beschrieben sind. Man darf den Autoren zu diesem gelungenen Buch, das seinem Preis wert ist, gratulieren und kann dem Buch nur noch viele weitere Leser wünschen.

M. Breitsameter

SPIXIANA	**24**	1	53–72	München, 01. März 2001	ISSN 0341-8391

Further new and rare species of the genera *Fortagonum* Darlington and *Collagonum* Baehr from New Guinea

(Insecta, Coleoptera, Carabidae, Agoninae)*

Martin Baehr

Baehr, M. (2001): Further new and rare species of the genera *Fortagonum* Darlington and *Collagonum* Baehr from New Guinea (Insecta, Coleoptera, Carabidae, Agoninae). – Spixiana **24/1:** 53-72

Fortagonum hornabrookianum, spec. nov., *Fortagonum substriatum*, spec. nov., *Collagonum thoracicum*, spec. nov., all from central Papua New Guinea, *Fortagonum insulare*, spec. nov. from Japen Island, and *Fortagonum laevissimum*, spec. nov. and *Collagonum longipenne*, spec. nov., both from Star Mountains, westernmost Papua New Guinea are described. For both genera *Fortagonum* and *Collagonum* new keys are provided that replace the most recent keys to the respective genera (Baehr 1995, 1998). For *Collagonum thoracicum*, spec. nov. a new subgenus *Procollagonum*, and for *Collagonum distortum* (Darlington) and *Collagonum limum* (Darlington) a new subgenus *Paracollagonum* is erected. In view of striking differences in external morphology, but in particular in shape of the male aedeagus, *Procollagonum* is the most plesiotypic member of *Collagonum*, whereas *Paracollagoum* combines plesiomorphic character states in structure of the male genitalia with highly apomorphic character states in external morphology.

Dr. Martin Baehr, Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany.

Introduction

Recently Dr. R. W. Hornabrook (Wellington, New Zealand) kindly sent me a sample of carabid beetles from New Guinea (mainly Papua New Guinea) for identification. Although they were collected 25-30 years ago, they were no more included in Darlington's (1968, 1971) monograph about the Carabidae of New Guinea. The sample includes a number of new records and new species, inter alia two new species of the genus *Fortagonum* Darlington and one new species of the genus *Collagonum* Baehr that are being described below. Material received recently from Mr. A. Riedel (München), the indefatigable and unexcelled collector of rare species from Irian Jaya, and from Mr. P. Schüle, (Düsseldorf) included three additional new taxa of the genus *Fortagonum* that are added to this paper.

The genus *Fortagonum* was founded by Darlington (1952). In a supplementary volume, Darlington (1971) described several additional species of very different shape and structure. Baehr (1992) again described additional species, and Baehr (1995) redefined the genus and erected a new genus *Collagonum* for some species hitherto included in *Fortagonum*. Most recently Baehr (1998) again described additional species of *Fortagonum* and gave a revised key to this genus. The most recent key to the species of *Collagonum* was given by Baehr (1995).

* In part results of the scientific collections of A. Riedel in New Guinea 1998.

Measurements

Measurements were made under a stereo microscope using an ocular micrometer. Length has been measured from tip of labrum to apex of elytra, hence, measurements may slightly differ from those of Darlington. Length of pronotum for width/length ratio has been measured from middle of apex to base.

Location of types

The types are shared with the Museum of New Zealand, Wellington (MNZ) and Zoologische Staatssammlung, München (ZSM). Some paratypes are located in the working collection of the author at Zoologische Staatssammlung (CBM).

Fortagonum insulare, spec. nov.

Fig. 6

Types. Holotype: ♀, 5.8.1996 41 Schüle/Stüben West Papua 1000 m Japen Serui nach Ambeidiru km 9 Primärwald (ZSM). – Paratype: 1♀, same data (CBM).

Diagnosis. Distinguished from its nearest relative, *F. spinipenne* Baehr, by light colour of surface, legs, and antennae, and by basally wider pronotum that also has less projecting anterior angles.

Description

Measurements. Length: 10.4-10.6 mm; width: 4.10-4.25 mm. Ratios. Width/length of pronotum: 1.48-1.52; width base/apex of pronotum: 1.68-1.74; width pronotum/head: 1.85-1.96; width elytra/pronotum: 1.64-1.68; length/width of elytra: 1.29-1.37.

Wing-and-seta formula: + w; –+ +; – –; – + +.

Colour. Dark reddish piceous, lateral margin of pronotum, suture of elytra, labrum, and mandibles slightly lighter. Mouth parts, antenna, tibiae, and tarsi light reddish, femora slightly darker. Lower surface piceous.

Head. Rather narrow compared with prothorax. Neck rather wide, somewhat imbedded in prothorax. Eyes fairly large, laterally moderately projecting, orbits distinct, evenly curved. Clypeal suture distinct. Labrum rectangular, apex feebly concave. Mandibles elongate, straight, but not porrect. Antenna very slender and elongate, surpassing base of pronotum by about four antennomeres, median antennomeres almost 5 × as long as wide. Both palpi slender and elongate, basal palpomere of maxillary palpus thickened. Mentum with an elongate, unidentate tooth. No furrow medially of eyes, though a shallow furrow above antennal base present. Either both supraocular setae present or only the posterior supraocular seta present, the latter situated at posterior margin of eye. Clypeus and anterior part of frons with short, shallow, parallel furrow on either side, frons evenly convex, absolutely smooth. Microreticulation isodiametric, somewhat superficial. Surface glossy.

Prothorax. Comparatively narrow, somewhat conical, widest at posterior third, laterally evenly though feebly convex, strongly narrowed to apex, moderately narrowed to base. Disk slightly convex, lateral margins widely explanate though barely separated from disk. Anterior angles rather projecting, obtuse at apex. Apex regularly and deeply excised. Basal angles rectangular, at apex obtusely rounded. Base laterally straight, in middle very faintly produced. Disk convex with extremely shallow, v-shaped sulcus in apical fourth, base near basal margin with a rather deep, oblique, somewaht linear impression on either side and with a very shallow transverse impression. Median line incomplete, very fine, ending far from apex and base. Apex distinctly bordered, lateral margin and base not bordered. Both marginal setae absent. Disk impunctate. Microreticulation very fine, absent on disk, near apex and base highly superficial, isodiametric. Surface glossy.

Elytra. Rather narrow and elongate, dorsal surface markedly convex, lateral borders in middle almost straight. Preapical sinuosity extremely feeble. Widest diameter about in middle. Humeri wide, obtusely angulate but not dentate, apex spinose with elongate spine opposite 3rd interval, spines rather widely separated. Sutural angle with minute denticle. Striae shallow, deepened towards apex, minutely punctulate, intervals depressed. Anterior discal seta absent, both median and posterior setae situated

at 2nd stria. 17-18 marginal setae and 1 preapical seta at 7th stria present, humeral group of marginal series consisting of 6 setae, median and apical pores not much more conspicuous than basal pores, series slightly interrupted in middle. Intervals impunctate. Microreticulation almost wanting. Surface highly glossy, rather iridescent. Posterior wings present.

Lower surface. Prosternal process short, posteriorly slightly convex, triangular, ventrolaterally and posterolaterally bordered. Proepisternum smooth. Mesepisternum coarsely punctate. Metepisternum moderately elongate, c. 1.5 × as long as wide at anterior border. Epipleura anteriorly moderately wide, rugose. Abdomen impunctate, though laterally with several fine, elongate wrinkles and shallow impressions. Microreticulation dense, isodiametric, very superficial. ♂ sternum VII unknown, ♀ sternum VII quadrisetose, apex regularly curved.

Legs. Very elongate and slender. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. Vestiture of ♂ anterior tarsus unknown.

♂ genitalia. Unknown.

♀ genitalia. Stylomere 2 rather elongate, little curved, with obtuse apex, with 3 fairly small ventral ensiform setae, a dorsal ensiform seta situated about in middle, and one nematiform seta in a deep furrow moderately close to apex. Apex of stylomere 1 ventrally with 7-8 setae near base of stylomere 2. Lateral plate with 8-9 setae at or near margin.

Variation. Rather similar though the paratype has slightly wider pronotum and elytra, and it possesses only the posterior supraorbital seta, which is the first instance of instability of chetaotaxy of supraorbital setae ever recorded in the genus.

Distribution. Japen Island, western central Irian Jaya. Known only from type locality.

Collecting circumstances. Largely unknown. Both specimens collected in "primary forest" at median altitude, probably under log or in litter on the ground.

Etymology. The name refers to the occurrence on Japen Island.

Relationships. Certainly this species is very closely related to *F. spinipenne* Baehr form mainland western central Irian Jaya that externally looks extremely similar. Unfortunately, the male genitalia are thus far unknown in both species. Because in the species group to which both species belong aedeagi usually are highly distinctive, reference to the aedeagi when they are known may settle the question of full specific or of subspecific status of *F. insulare.*

Fortagonum substriatum, spec. nov.

Figs 1, 7

Types. Holotype: ♂, Papua NG, Morobe-Pr. Mindik 1400-1500 m 27.4.1998, A. Riedel (ZSM). – Paratype: 1♀, same data (CBM).

Diagnosis. Distinguished by presence of wings, absence of anterior supraocular seta, both pronotal setae, and anterior discal seta, rather narrow, fairly conical pronotum, narrow and elongate elytra, and markedly elongate elytral spine opposite 3rd stria. Distinguished from most closely related species *F. spinipenne* Baehr and *F. insulare*, spec. nov. by colouration, longer elytra, shallow, almost impunctate striation and the many sclerotizations in the internal sac.

Description

Measurements. Length: 11.1-11.7 mm; width: 4.45-4.65 mm. Ratios. Width/length of pronotum: 1.44-1.46; width base/apex of pronotum: 1.60-1.65; width pronotum/head: 1.86-1.90; width elytra/pronotum: 1.62-1.66; length/width of elytra: 1.35-1.38.

Wing-and-seta formula: + w; – +; – –; – + +.

Colour. Glossy black, elytra with very faint greenish lustre. Labrum, mouth parts, antenna, and median and posterior tarsi piceous, three basal antennomeres black, anterior tarsi reddish. Lower surface black.

Head. Moderately narrow compared with prothorax. Neck rather wide, somewhat imbedded in prothorax. Eyes fairly large, laterally moderately projecting, orbits distinct, evenly curved. Clypeal suture distinct. Labrum rectangular, apex feebly concave. Mandibles elongate, straight, but not porrect.

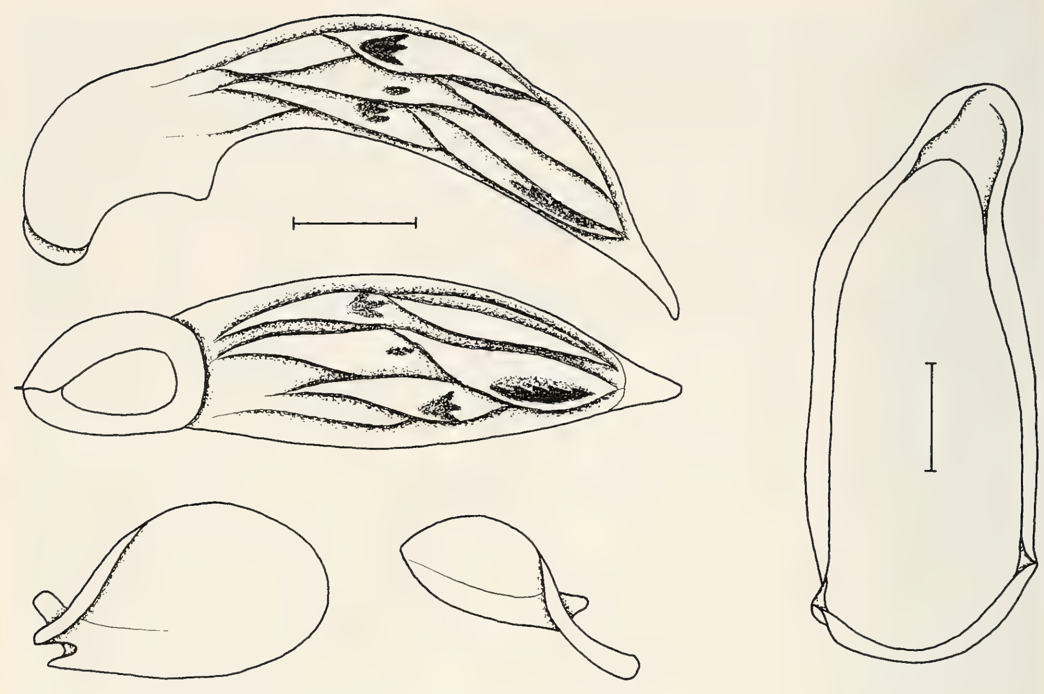


Fig. 1. *Fortagonum substriatum*, spec. nov. ♂ genitalia. Scale: 0.5 mm.

Antenna very slender and elongate, surpassing base of pronotum by more than four antennomeres, median antennomeres > 5 × as long as wide. Both palpi slender and elongate, basal palpomere of maxillary palpus thickened. Mentum with an elongate, unidentate tooth. No furrow medially of eyes, though a shallow furrow above antennal base present. Only posterior supraocular seta present, at posterior margin of eye. Clypeus and anterior part of frons with short, shallow, parallel furrow on either side, frons evenly convex, absolutely smooth. Microreticulation isodiametric, somewhat superficial. Surface glossy.

Prothorax. Comparatively narrow, somewhat conical, widest in posterior third, laterally evenly though feebly convex, strongly narrowed to apex, moderately narrowed to base. Disk slightly convex, lateral margins widely explanate though barely separated from disk. Anterior angles rather projecting, obtuse at apex. Apex regularly and deeply excised. Basal angles rectangular, at apex obtusely rounded. Base laterally straight, in middle very faintly produced. Disk convex with extremely shallow, v-shaped sulcus in apical fourth, base near basal margin with a rather deep, circular impression on either side and with a very shallow transverse impression. Median line incomplete, very fine, ending far from apex and base. Apex distinctly bordered, lateral margin and base not bordered. Both marginal setae absent. Disk impunctate. Microreticulation very fine, absent on disk, near apex and base highly superficial, isodiametric. Surface glossy.

Elytra. Comparatively narrow and elongate, dorsal surface markedly convex, lateral borders in middle almost straight. Preapical sinuosity extremely feeble. Widest diameter about in middle. Humeri wide, obtusely angulate but not dentate, apex spinose with elongate spine opposite 3rd interval, spines rather widely separated. Sutural angle with minute denticle. Striae very shallow, deepened towards apex, extremely finely, almost invisibly punctulate, intervals depressed. Anterior discal seta absent, both median and posterior setae situated at 2nd stria. 17-18 marginal setae and 1 preapical seta at 7th stria present, humeral group of marginal series consisting of 6 setae, median and apical pores not much more conspicuous than basal pores, series slightly interrupted in middle. Intervals impunctate. Microreticulation almost wanting. Surface highly glossy, rather iridescent. Wings present.

Lower surface. Prosternal process short, posteriorly slightly convex, triangular, ventrolaterally and posterolaterally bordered. Proepisternum smooth. Mesepisternum coarsely punctate. Metepister-

num moderately elongate, c. 1.5 × as long as wide at anterior border. Epipleura anteriorly moderately wide, rugose. Abdomen impunctate, though laterally with several fine, elongate wrinkles and shallow impressions. Microreticulation dense, isodiametric, very superficial. ♂ sternum VII bisetose, ♀ sternum VII quadrisetose, apex regularly curved.

Legs. Very elongate and slender. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. 1st-3rd tarsomeres of ♂ anterior tarsus biseriately squamose.

♂ genitalia. Genital ring narrow, rather parallel, at apex asymmetric. Aedeagus stout, rather symmetric, lower surface very faintly bisinuate. Apex acute and rather short, lateral margins near apex faintly concave. Internal sac with four denticulate sclerites: one elongate, about quadridentate rod apically at bottom of right side, two tridentate plates basally at roof on right and left sides, respectively, and a small unidentate plate in middle. Both parameres wide, at apex very faintly angulate.

♀ genitalia. Stylomere 2 rather elongate, little curved, with obtuse apex, with 3 fairly small ventral ensiform setae, a dorsal ensiform seta situated about in middle, and one nematiform seta in a deep furrow moderately close to apex. Apex of stylomere 1 ventrally with 6-8 setae near base of stylomere 2. Lateral plate with 6-8 setae at or near margin.

Variation. Apart of some minor differences in shape of pronotum little variation noted.

Distribution. Eastern central Papua New Guinea. Known only from type locality.

Collecting circumstances. Unknown. Presumably collected under log in rain forest at median altitude.

Etymology. The name refers to the light striation of the elytra.

Relationships. This species is presumably most closely related to *F. spinipenne* Baehr, *F. insulare*, spec. nov., and *F. subconicolle* Darlington, though is distinguished by narrower elytra and very shallow, almost impunctate elytral striae.

Fortagonum hornabrookianum, spec. nov.

Figs 2, 8

Types. Holotype: ♂, Garaina Morobe District NE. New Guinea Hornabrook (MNZ).

Diagnosis. Characterized by presence of wings, absence of anterior supraocular seta, both pronotal setae, and anterior discal seta, rather narrow, fairly conical pronotum, narrow and elongate elytra, and markedly elongate elytral spine opposite 3rd stria. Distinguished from most closely related species *F. spinipenne* Baehr and *F. insulare*, spec. nov. by violaceous lustre of elytra, approached elytral spines, and almost impunctate elytral striae.

Description

Measurements. Length: 11.0 mm; width: 4.4 mm. Ratios. Width/length of pronotum: 1.45; width base/apex of pronotum: 1.53; width pronotum/head: 1.86; width elytra/pronotum: 1.64; length/width of elytra: 1.29.

Wing-and-seta formula: +w; – +; – –; – + +.

Colour. Dark piceous black, elytra with slight violaceous lustre. Lateral margins of pronotum faintly reddish translucent, labrum, mouth parts, antenna, and tarsi dark reddish-piceous, antenna from 3rd antennomere reddish. Femora and tibiae piceous. Lower surface black.

Head. Moderately narrow compared with prothorax. Neck rather wide, somewhat imbedded in prothorax. Eyes fairly large, laterally moderately projecting, orbits distinct, evenly curved. Clypeal suture distinct. Labrum rectangular, apex feebly concave. Mandibles elongate, straight, but not porrect. Antenna very slender and elongate, surpassing base of pronotum by about four antennomeres, median antennomeres c. 5 × as long as wide. Both palpi slender and elongate, basal palpomere of maxillary palpus thickened. Mentum with an elongate, unidentate tooth. No furrow medially of eyes, though a shallow furrow above antennal base present. Only posterior supraocular seta present, at posterior margin of eye. Clypeus and anterior part of frons with short, shallow, parallel furrow on either side, frons evenly convex, absolutely smooth. Microreticulation isodiametric, extremely superficial. Surface highly glossy.

Prothorax. Comparatively narrow, somewhat conical, widest at posterior third, laterally evenly

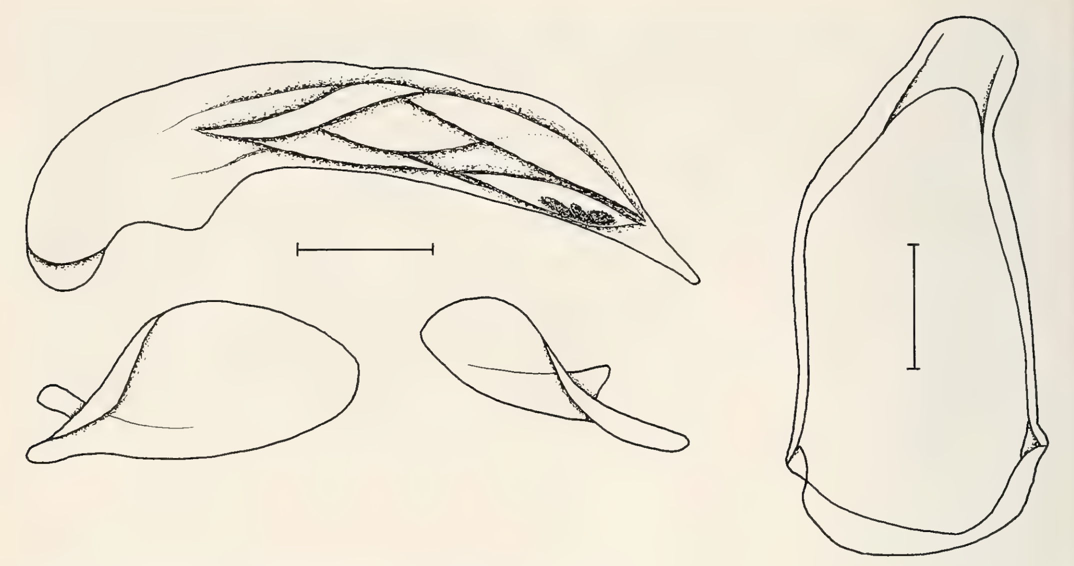


Fig. 2. *F. hornabrookianum*, spec. nov. ♂ genitalia. Scale: 0.5 mm.

though feebly convex, strongly narrowed to apex, moderately narrowed to base. Disk slightly convex, lateral margins widely explanate though barely separated from disk. Anterior angles rather projecting, obtuse at apex. Apex regularly and deeply excised. Basal angles rectangular, at apex obtusely rounded. Base laterally straight, in middle very faintly produced. Disk convex with extremely shallow, v-shaped sulcus in apical fourth, base near basal margin with a rather deep, oblique, slightly longitudinal impression on either side and with a very shallow transverse impression. Median line incomplete, very fine, ending far from apex and base. Apex distinctly bordered, lateral margin and base not bordered. Both marginal setae absent. Disk impunctate. Microreticulation very fine, absent on disk, near apex and base highly superficial, isodiametric. Surface highly glossy.

Elytra. Rather narrow and elongate, dorsal surface markedly convex, lateral borders in middle almost straight. Preapical sinuosity extremely feeble. Widest diameter about in middle. Humeri wide, obtusely angulate but not dentate, apex spinose with elongate spine opposite 3rd interval, though rather approached. Sutural angle with minute denticle. Striae shallow, deepened towards apex, only inner four striae extremely finely punctulate, puncturation barely recognizable, intervals depressed. Anterior discal seta absent, both median and posterior setae situated at 2nd stria. 18-19 marginal setae and 1 preapical seta at 7th stria present, humeral group of marginal series consisting of 6 setae, median and apical pores not much more conspicuous than basal pores, series slightly interrupted in middle. Intervals impunctate. Microreticulation wanting. Surface highly glossy, iridescent. Posterior wings present.

Lower surface. Prosternal process short, posteriorly slightly convex, triangular, ventrolaterally and posterolaterally bordered. Proepisternum smooth. Mesepisternum coarsely punctate. Metepisternum moderately elongate, c. 1.5 × as long as wide at anterior border. Epipleura anteriorly moderately wide, rugose. Abdomen impunctate, though laterally with several fine, elongate wrinkles and shallow impressions. Microreticulation dense, isodiametric, very superficial. ♂ sternum VII bisetose, ♀ sternum unknown, apex regularly curved.

Legs. Very elongate and slender. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. 1st-3rd tarsomeres of ♂ anterior tarsus biseriately squamose.

♂ genitalia. Genital ring rather parallel, at apex highly asymmetric, apex wide. Aedeagus fairly elongate, rather symmetric, lower surface very faintly concave. Apex acute, moderately elongate, straight. Internal sac on right side at bottom near apex with a small, elongate, faintly tridentate sclerotized plate. Both parameres rather wide, at apex evenly convex.

♀ genitalia. Unknown.

Variation. Unknown.

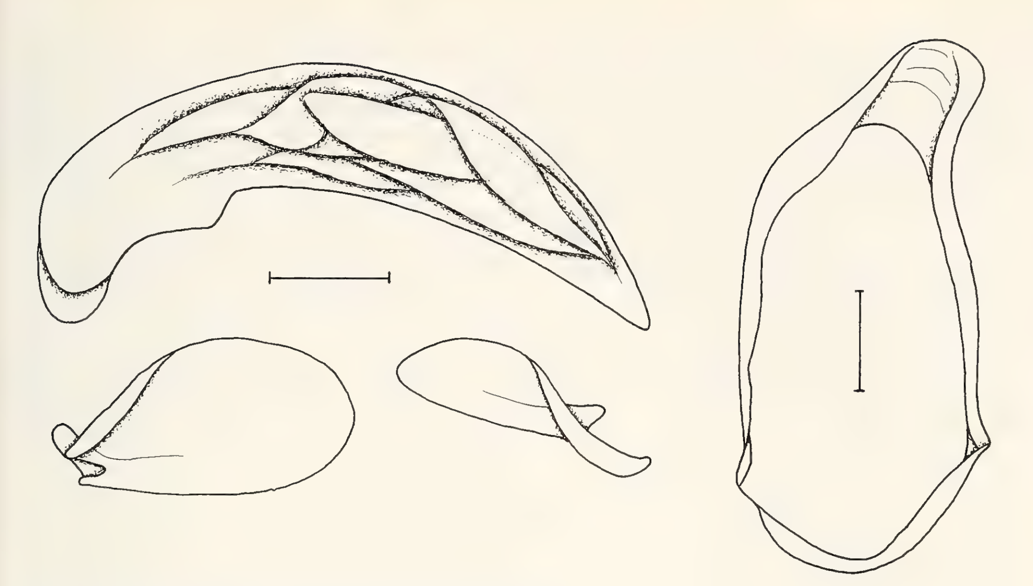


Fig. 3. *F. laevissimum*, spec. nov. ♂ genitalia. Scale: 0.5 mm.

Distribution. Eastern central Papua New Guinea. Known only from type locality.

Collecting circumstances. Unknown. Presumably collected under log in rain forest of median altitude.

Etymology. The name is an acronym in honour of the collector of this and additional species.

Relationships. This species certainly belongs to the *bisetosiceps*-group, but occupies a somewhat isolated position due to the markedly approached elytral spines.

Fortagonum laevissimum, spec. nov.

Figs 3, 9

Types. Holotype: ♂, Busalmin 5000 ft. Star Mts. 16/10/75 Papua New Guinea R. W. Hornabrook (MNZ).

Diagnosis. Distinguished by presence of wings, absence of anterior supraocular seta, both pronotal setae, and anterior discal seta, fairly narrow and elongate elytra, and elongate elytral spine opposite 3rd stria. Distinguished from other species of the *bisetosiceps*-group by colouration, wide, triangular pronotum, laevigate elytra, and almost unarmed aedeagus.

Description

Measurements. Length: 11.1 mm; width: 4.6 mm. Ratios. Width/length of pronotum: 1.60; width base/apex of pronotum: 1.78; width pronotum/head: 2.10; width elytra/pronotum: 1.59; length/width of elytra: 1.24.

Wing-and-seta formula: + w; – +; – –; – + +.

Colour. Reddish-piceous, elytra with distinct greenish lustre. Palpi, antenna, and tarsi light reddish, 3rd antennomere apically slightly darker, femora and tibae piceous. Lower surface piceous.

Head. Narrow compared with prothorax. Neck rather wide, somewhat imbedded in prothorax. Eyes fairly large, laterally moderately projecting, orbits distinct, evenly curved. Clypeal suture distinct. Labrum rectangular, apex feebly concave. Mandibles elongate, straight, but not porrect. Antenna slender and elongate, surpassing base of pronotum by slightly < 4 antennomeres, median antennomeres c. 4.5 × as long as wide. Both palpi slender and elongate, basal palpomere of maxillary palpus thickened. Mentum with an elongate, unidentate tooth. No furrow medially of eyes, though a shallow furrow above antennal base present. Only posterior supraocular seta present, at posterior margin of eye. Clypeus and anterior part of frons with short, shallow, parallel furrow on either side, frons evenly

convex, absolutely smooth. Microreticulation extremely superficial, isodiametric. Surface highly glossy.

Prothorax. Wide, markedly triagonal, widest near base, laterally evenly though feebly convex, strongly narrowed to apex, barely narrowed to base. Disk slightly convex, lateral margins widely explanate though barely separated from disk. Anterior angles rather projecting, obtuse at apex. Apex regularly and deeply excised. Basal angles rectangular, at apex obtusely rounded. Base laterally straight, in middle very faintly produced. Disk convex with extremely shallow, v-shaped sulcus in apical fourth, base near basal margin with a rather deep, circular impression on either side and with a very shallow transverse impression. Median line incomplete, very fine, ending far from apex and base. Apex distinctly bordered, lateral margin and base not bordered. Both marginal setae absent. Disk impunctate. Microreticulation absent on disk, near apex and base very fine, highly superficial, isodiametric. Surface highly glossy.

Elytra. Comparatively short and wide, dorsal surface markedly convex, lateral borders in middle almost straight. Preapical sinuosity extremely feeble. Widest diameter about in middle. Humeri wide, obtusely angulate but not dentate, apex spinose with comparatively short spine opposite 3rd interval, spines rather widely separated. Sutural angle with minute denticle. Striae not impressed, extremely superficial, marked as rows of extremely fine punctures, striae not deepened towards apex, intervals depressed. Anterior discal seta absent, both median and posterior setae situated at 2nd stria, punctures somewhat foveate. 16 marginal setae and 1 preapical seta at 7th stria present, humeral group of marginal series consisting of 6 setae, median and apical pores not much more conspicuous than basal pores, rather foveate, series slightly interrupted in middle. Intervals impunctate. Microreticulation absent. Surface highly glossy, rather iridescent. Wings present.

Lower surface. Prosternal process short, posteriorly slightly convex, triangular, ventrolaterally and posterolaterally bordered. Proepisternum smooth. Mesepisternum slightly punctate. Metepisternum moderately elongate, $< 1.5 \times$ as long as wide at anterior border. Epipleura anteriorly moderately wide, rugose. Abdomen impunctate, though laterally with several fine, elongate wrinkles and shallow impressions. Microreticulation dense, isodiametric, very superficial. ♂ sternum VII bisetose, ♀ sternum VII unknown, apex regularly curved.

Legs. Very elongate and slender. 4th tarsomere medially faintly excised. 5th tarsomere asetose beneath. 1st-3rd tarsomeres of ♂ anterior tarsus biseriately squamose.

♂ genitalia. Genital ring rather parallel, at apex asymmetric. Aedeagus stout, rather symmetric, lower surface faintly concave. Apex short and acute, regularly triangular, symmetric. Internal sac without any sclerotized plates. Left paramere rather wide, at apex evenly convex, right paramere comparatively elongate.

♀ genitalia. Unknown.

Variation. Unknown.

Distribution. Westernmost Papua New Guinea. Known only from type locality.

Collecting circumstances. Unknown. Presumably collected under log in rain forest at median altitude.

Etymology. The name refers to the laevigate elytra.

Relationships. This species certainly belongs to the *bisetosiceps*-group, but occupies a somewhat isolated position due to the markedly wide pronotum, extremely fine elytral striation, and almost unarmed aedeagus.

Genus *Collagonum* Baehr

Baehr, 1995: 30.

Note. The genus *Collagonum* Baehr was erected for those species of Darlington's genus *Fortagonum* that are characterized by

1. distorted, disk-like pronotum as shown in fig. 11;
2. more or less deep sulcus medially of eye that separates the eye from the frons;
3. characteristically elongate, rod-shaped apex of the aedeagus.

The typical species (of the nominate subgenus) usually also have elongate, not spinose elytra that bear 3 discal punctures. Almost all species are fully winged (see appendix 2).

Subgenus *Procollagonum*, subgen. nov.

Diagnosis. Without the distorted, disk-like pronotum of genus *Collagonum*, but with sulcus medially of eye and with rounded humeri. Elytra short, without discal punctures. Eyes not abruptly prominent. 1st-3rd tarsomeres of ♂ anterior tarsus with few sparse squamae on inner side. Aedeagus with short, somewhat rod-like apex, fairly similar to that of typical *Collagonum*, but perceptibly shorter.

Type species. *Collagonum thoracicum*, spec. nov., by monotypy.

Remarks. The single species *C. thoracicum*, spec. nov. is included in the genus *Collagonum* because of the presence of the sulcus medially of the eye and of its male aedeagus which is fairly similar to those of *Collagonum* s. str. in that it bears a somewhat disjoined, rod-like apex which, however, is shorter and less disjoined. In other characters the species reminds either species of *Fortagonum* Darlington (not distorted, disk-like pronotum), or those of the subgenus *Paracollagonum* (short, ovalish elytra, absence of discal punctures). Presumably, in certain aspects this is the most basic species of the whole *Collagonum*-complex.

Collagonum thoracicum, spec. nov.
Figs 4, 10

Types. Holotype: ♂, Papua NG, Morobe-Pr. Saureri 10 km s. Garaina 1600-1800 m 24.-25.3.1998, A. Riedel (ZSM-CBM). – Paratypes: 2♂♂, Papua NG, Morobe-Pr. Saureri 10 km s. Garaina 1550-1700 m 27.3.1998, A. Riedel (CBM).

Diagnosis. Distinguished by absence of wings, absence of all fixed setae on head, pronotum, and elytra, wide, not distorted pronotum with markedly narrowed base, wide and short, unarmed elytra, and short, rod-like apex of aedeagus.

Description

Measurements. Length: 8.7-8.9 mm; width: 3.7-3.9 mm. Ratios. Width/length of pronotum: 1.46-1.50; width base/apex of pronotum: 1.50-1.54; width pronotum/head: 1.90-1.91; width elytra/pronotum: 1.36-1.39; length/width of elytra: 1.19-1.21.

Wing-and-seta formula: – w; – –; – –; – – –.

Colour. Black, including four basal antennomeres, femora, and tibiae. Elytra with faint violaceous lustre. Labrum and mandibles piceous, palpi, antenna, and tarsi reddish. Lower surface black.

Head. Narrow compared with prothorax. Neck rather narrow, elongate behind eyes. Eyes rather large, moderately protruding, orbits short, obliquely convex. Clypeal suture distinct. Labrum moderately elongate, apex straight. Mandibles moderately elongate, straight. Antenna moderately elongate, surpassing base of pronotum by c. 2½ antennomeres, median antennomeres c. 2.5 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. Furrow above antennal base and encircling the eye deep, conspicuous. Both supraocular setae absent. Frons rather evenly convex, impunctate, laterally with a shallow groove that is crossed by some oblique wrinkles. Microreticulation extremely fine, very superficial, isodiametric. Surface glossy.

Prothorax. Wide, lateral margin slightly deplanate, especially in posterior half, evenly curved, slightly more narrowed to apex than to base. Widest diameter a short distance behind middle. Anterior angles projecting, at apex widely rounded off. Apex deeply excised, excision almost straight. Lateral margin in posterior half convex, just in front of basal angles very gently concave, basal angles angulate, c. 100°, at apex obtuse. Base laterally straight, in middle feebly produced. Disk rather convex, lateral parts slightly deplanate. Anterior transverse depression barely visible, median line fine, almost attaining apex and base, base with a shallow transverse depression. Basal grooves deep, large, irregularly circular. Apex and lateral margins bordered, base bordered in middle. Both marginal setae absent. Lateral channel and basal grooves coarsely and irregularly punctate-vermiculate. Disk impunctate, though with some fine, transverse wirnkles. Microreticulation near apex and base highly superficial, barely visible, about isodiametric, in middle absent. Surface on disk highly glossy.

Elytra. Short and wide, dorsal surface highly convex, lateral borders almost straight in anterior ⅗, towards apex evenly rounded. Widest diameter about in middle. Preapical sinuosity rather shallow. Humeri wide, rounded. Apex separately rounded, without denticle at sutural angle. Striae fairly deep,

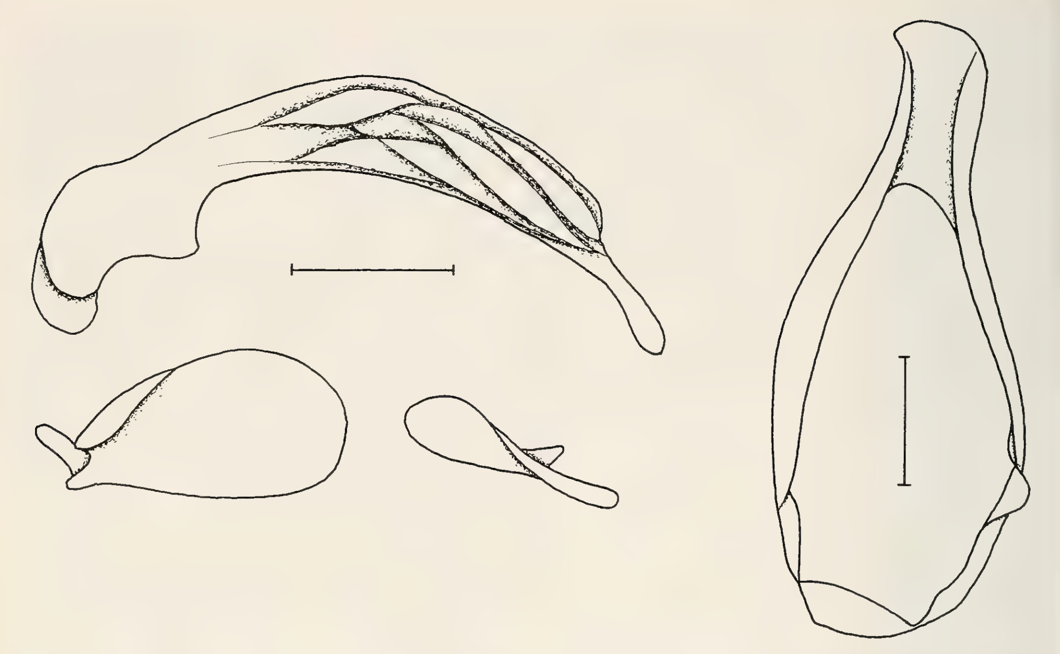


Fig. 4. *Collagonum (Procollagonum) thoracicum,* spec. nov. ♂ genitalia. Scale: 0.5 mm.

impunctate, intervals slightly convex. Discal setae absent. 17-18 marginal setae and 2 apical setae present, the latter situated near end of 7th stria. Intervals impunctate. Microreticulation absent. Surface markedly iridescent. Posterior wings very short.

Lower surface. Prosternum very short, not surpassing procoxae, rounded off, posteriorly depressed, ventrally bordered. Proepisternum almost impunctate, with dense microreticulation. Mesepisternum rather densely, though somewhat superficially punctate. Metepisternum short, c. 1.2 × as long as wide at anterior border. Epipleura anteriorly moderately wide, posteriorly very narrow, moderately rugose. Abdomen impunctate, though laterally with some fine wrinkles. Microreticulation distinct, isodiametric. ♂ sternum VII bisetose, ♀ sternum VII unknown, apex evenly rounded.

Legs. Moderately thin and elongate. 5th tarsomere asetose beneath. 4th tarsomere medially slightly excised. 1st-3rd tarsomeres of ♂ anterior tarsus sparsely, asymmetrically squamose.

♂ genitalia. Genital ring very elongate, with elongate, slightly asymmetric, spoon-shaped apex. Aedeagus slightly curved, apical part extended to a moderately elongate, strongly sclerotized rod that is slightly downcurved and slighty widened towards apex. Internal sac without sclerotized plates or teeth. Both parameres rather elongate, at apex evenly rounded.

♀ genitalia. Unknown.

Variation. Very little variation noted.

Distribution. Eastern central Papua New Guinea. Known only from type locality.

Collecting circumstances. Unknown. Presumably collected under log in rain forest at median altitude.

Etymology. The name refers to the unusual shape of the pronotum.

Genus *Paracollagonum,* subgen. nov.

Diagnosis. With external characters of genus *Collagonum,* e.g. wide, distorted pronotum, deep sulcus medially of eye, rounded humeri. But aedeagus without the elongate, rod-like apex of typical *Collagonum,* elytra without discal punctures, eyes abruptly prominent, and pronotum with very wide, conspicuously upturned margins.

Type species. *Fortagonum distortum* Darlington, 1971, by present designation.

Remarks. In view of its short, impunctate elytra, abruptly prominent eyes, very wide, conspicuously upturned margins of pronotum *Collagonum limum* (Darlington) probably belongs to this subgenus. However, any final decision is premature, until the male genitalia of this species are recorded which so far is known only from the slightly damaged female holotype.

Collagonum (Paracollagonum) distortum (Darlington)

Darlington 1971, p. 321, fig. 76 *(Fortagonum);* Mateu 1977, p. 21, fig. 1 *(Fortagonum);* Baehr 1992, p. 75 *(Fortagonum);* Baehr 1995, p. 31 *(Collagonum).*

This peculiar species is externally similar to the other species of the genus *Collagonum* Baehr that was erected for those species of the genus *Fortagonum* Darlington that possess a deep sulcus medially of the eyes, a characteristically wide, distorted pronotum, and a conspicuous, elongate, rod-like apex of aedeagus. Although in some other character states *C. distortum* is also different from all other species of *Collagonum* except for *C. limum* Darlington (see above), namely in the distorted head, abruptly prominent eyes, very wide and upturned lateral margins of pronotum, short ovalish, impunctate elytra, the main difference is in shape of the aedeagus that does not show the markedly elongate apex typical for all species of the genus *Collagonum* that have been examined for this character. As figured in Mateu (1977), the aedeagus has a fairly short apex, although in those specimens examined by me the apex is longer and more disjoined than in Mateu's figure. In spite of this important difference, *C. distortum* is yet included in the genus *Collagonum*, though ranked in a new subgenus *Paracollagonum*, because it takes a basic though at the same time highly isolated taxonomic position within the genus *Collagonum*.

New records: 1♂, Lufa, Mt. Michael, New Guinea, 18.10.72, R. Hornabrook (MNZ); 1♂, Okapa, Eastern Highlands, New Guinea, 3.1.1974, R. Hornabrook (MNZ); 1♂, Daulo Pass, Asarao-Chimbu Divide, New Guinea, 13.3.72, R. Hornabrook (CBM).

Subgenus *Collagonum* s. str.

Baehr, 1995: 30.

Type species. *Fortagonum laticolle* Baehr, 1992, by original designation.

Note. The subgenus *Collagonum* s. str. conforms with the diagnosis as given in the original description of the genus (Baehr 1995).

Collagonum violaceum Baehr

Baehr 1995, p. 33, figs 18, 21, 22.

New records: 1♀, Marawaka, Eastern Highlands, New Guinea, R. Hornabrook (MNZ); 1♀, Orie, Okapa, Eastern Highlands, New Guinea, Jan. 1968, R. Hornabrook (MNZ).

Note. This species if known from a rather restricted area in the Eastern Highlands of Papua New Guinea.

Collagonum longipenne, spec. nov.
Figs 5, 11

Types. Holotype: ♂, Bultem 5000 ft. Star Mts. 23/10/75 Papua New Guinea R. W. Hornabrook (MNZ).

Diagnosis. Distinguished from its nearest relative *C. riedeli* Baehr by longer and narrower elytra and wider prothorax with less acute and less produced anterior angles.

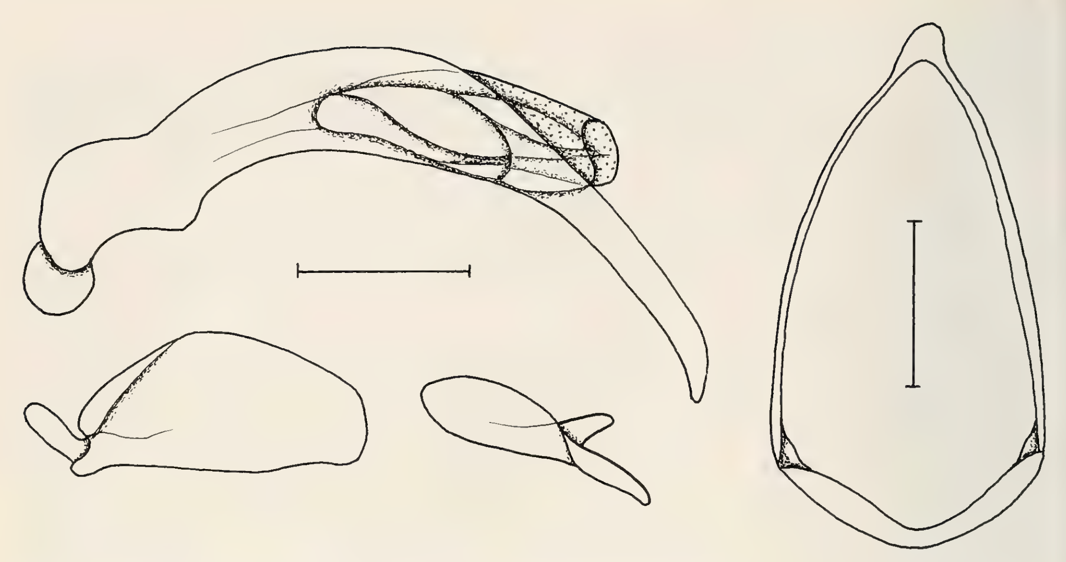


Fig. 5. *Collagonum* (s. str.) *longipenne*, spec. nov. ♂ genitalia. Scale: 0.5 mm.

Description

Measurements. Length: 12.4 mm; width: 4.5 mm. Ratios. Width/length of pronotum: 1.61; width base/apex of pronotum: 1.39; width pronotum/head: 1.89; width elytra/pronotum: 1.72; length/width of elytra: 1.10.

Wing-and-seta formula: + w; – –; – +; + + +.

Colour. The slightly immature holotype has black head and pronotum, and wide, reddish-piceous margins of pronotum and reddish-piceous elytra. Under the naked eye the elytra bear slight purplish lustre which vanishes when seen under the microscope. Labrum, mouth parts, antenna, and tarsi reddish,. 1st-3rd antennomeres, femora, and tibae slightly infuscate. Lower surface piceous.

Head. Narrow compared with prothorax. Neck rather narrow, elongate behind eyes. Eyes rather large, though but moderately protruding, orbits almost absent. Clypeal suture distinct. Labrum moderately elongate, apex straight. Mandibles moderately elongate, straight. Antenna moderately elongate, surpassing base of pronotum by slightly > two antennomeres, median antennomeres < 3 × as long as wide. Both palpi elongate, basal maxillary palpomere thickened. Furrow above antennal base and encircling the eye deep, conspicuous. Both supraocular setae absent. Frons rather evenly convex, impunctate, laterally with a shallow groove that is crossed by some oblique wrinkles. Microreticulation extremely fine, very superficial, isodiametric. Surface glossy.

Prothorax. Very wide, laterally very broadly deplanate, evenly curved, slightly more evenly narrowed to apex than to base. Widest diameter about in middle. Anterior angles remarkably projecting, at apex widely rounded off. Apex deeply excised, excision almost straight. Lateral margin convex to basal angles which bear a very small denticle. Base laterally straight, in middle feebly produced. Disk fairly convex, lateral parts broadly deplanate, slightly upturned. In anterior third with a shallow, slightly v-shaped depression, median line distinct, attaining neither apex nor base, base with a shallow transverse depression. Basal grooves deep, large, about circular. Apex bordered, lateral margins not bordered, base bordered in middle. Anterior marginal seta absent, posterior marginal seta broken, though puncture visible, situated right on posterior angle. Lateral channel and basal grooves coarsely and irregularly punctate-vermiculate, though punctures rather superficial. Disk impunctate, almost smooth. Microreticulation near apex and base about isodiametric, in middle extremely superficial, barely visible, consisting of extremely fine transverse lines. Surface on disk highly glossy.

Elytra. Elongate, comparatively narrow, parallel, dorsal surface convex, lateral borders almost straight in anterior ⅗, towards apex evenly rounded. Widest diameter about in middle. Preapical sinuosity rather shallow. Humeri wide, rounded. Apex with a short, rounded projection opposite 3rd interval. Sutural angle with a very small denticle. Striae deep, impunctate, intervals convex. Discal



Figs 6-11. Habitus. **6.** *Fortagonum insulare*, spec. nov. **7.** *F. substriatum*, spec. nov. **8.** *F. hornabrookianum*, spec. nov. **9.** *F. laevissimum*, spec. nov. **10.** *Collagonum (Procollagonum) thoracicum*, spec. nov. **11.** *Collagonum* (s. str.) *longipenne*, spec. nov. Lengths: 10.4 mm; 11.0 mm; 11.1 mm; 11.1 mm; 8.7 mm; 12.4 mm.

setae short, inconspicuous, anterior seta near 3rd stria, median and posterior setae near 2nd stria. 22-23 marginal setae and 3 apical setae present, two of the latter situated on apical border, one near 7th stria. Intervals impunctate. Microreticulation very superficial, barely visible, consisting of extremely fine, dense, transverse lines. Surface markedly iridescent. Posterior wings fully developed.

Lower surface. Prosternum very short, not surpassing procoxae, rounded off, posteriorly depressed, ventrally bordered. Proepisternum almost impunctate, with dense microreticulation. Mesepisternum rather densely, though somewhat superficially punctate. Metepisternum elongate, c. 2.5 × as long as wide at anterior border. Epipleura anteriorly moderately wide, posteriorly very narrow, moderately rugose. Abdomen impunctate, though laterally with some fine wrinkles. Microreticulation distinct, isodiametric. ♂ sternum VII bisetose, ♀ sternum VII unknown, apex evenly rounded.

Legs. Rather thin and elongate. 5th tarsomere asetose beneath. 4th tarsomere medially slightly excised. 1st-3rd tarsomeres of ♂ anterior tarsus biseriately squamose.

♂ genitalia. Genital ring moderately narrow, fairly symmetric, apex narrow, rather short. Aedeagus slightly curved, apical part extended to an elongate, strongly sclerotized rod that is downcurved with a distinct angle. Apex with acute, faintly downcurved tip. Internal sac without sclerotized plates or teeth. Both parameres rather elongate.

♀ genitalia. Unknown.

Variation. Unknown.

Distribution. Westernmost Papua New Guinea. Known only from type locality.

Collecting circumstances. Unknown. Presumably collected under log in rain forest at median altitude.

Etymology. The name refers to the remarkedly elongate elytra.

Relationships. This species is presumably most closely related to *F. riedeli* Baehr, though is distinguished by longer and narrower elytra.

Identification

For better identification of the new species the most recent keys to the genera *Fortagonum* and *Collagonum* (Baehr 1995, 1998) are completely updated.

Updated key to the species of the genus *Fortagonum* Darlington (sensu Baehr 1995)

1. Wings present .... 2.
– Wings absent .... 13.

2. Both pairs of supraocular setae absent .... 3.
– At least posterior supraocular seta present .... 4.

3. Elytra bisetose, elongate, >1.6× as long as wide, <1.33× as wide as pronotum, striae slightly crenulate, intervals depressed; aedeagus with two dentate sclerites in internal sac. Vogelkop, extreme western Irian Jaya .... *depressum* Baehr
– Elytra unisetose, shorter, c. 1.33 × as long as wide, c. 1.5 × as wide as pronotum, striae not crenulate, intervals slightly convex; aedeagus with a single dentate sclerite in internal sac. Western part of central Irian Jaya .... *sinak* Baehr

4. Both supraorbital setae present .... 5.
– Anterior supraorbital seta absent .... 6.

5. Pronotum basally much wider than apically. Eastern Irian Jaya .... *bisetosiceps* Baehr
– Pronotum basally slightly wider than apically (Fig. 6). Japen Island, weastern Irian Jaya .... *insulare*, spec. nov.

6. Elytra unisetose (only median seta present); prothorax little wider than long. Central eastern Irian Jaya .... *denticulatum* Baehr
– Elytra bisetose (median and posterior setae present); prothorax considerably wider than long. Distribution different .... 7.

7. Striae extremely fine, elytra almost laevigate, with greenish lustre. Westernmost Papua New Guinea .... *laevissimum,* spec. nov.
– Striae distinct, elytra not laevigate, with bluish or violaceous lustre .... 8.

8. Elytra wider and shorter, with short sutural spines (see figs 47, 48 in Darlington 1971) .... 9.
– Elytra narrow and elongate, with elongate sutural spines (Figs 6-8) .... 10.

9. Pronotum wider, sides more straight, anterior angles more protruding. Extreme western Irian Jaya .... *subconicolle* (Darlington)
– Pronotum narrower, sides more convex, anterior angles less protruding. Central Papua New Guinea .... *bigemum* (Darlington)

10. Sutural spines less widely separated (Fig. 8); elytra with distinct violaceous lustre. Eastern central Papua New Guinea .... *hornabrookianum,* spec. nov.
– Sutural spines widely separated (Figs 6, 7); elytra with bluish or blackish lustre .... 11.

11. Striae barely punctulate; elytra with faint bluish lustre; antennae piceous, only median and apical antennomeres reddish; aedeagus (Fig. 1). Eastern central Papua New Guinea .... *substriatum,* spec. nov.
– Striae distinctly punctulate; elytra without bluish lustre; antennae largely light reddish; aedeagus unknown. Western central Irian Jaya .... 12.

12. Colour deep black, legs largely blackish, basal antennomeres in part piceous; base of pronotum narrower, ratio base/apex c. 1.6. Panai Province, mainland of Irian Jaya .... *spinipenne* Baehr
– Colour reddish, tibiae and tarsi reddish, antennae including basal antennomeres light reddish; base of pronotum wider, ratio base/apex c. 1.7. Japen Island .... *insulare,* spec. nov.

13. Both supraocular setae absent .... 14.
– Posterior supraocular seta present .... 16.

14. Elytral striae superficial, intervals depressed, surface slightly iridescent. Western central Irian Jaya .... *laevigatum* Baehr
– Elytral striae deeply impressed, intervals markedly convex, surface not iridescent .... 15.

15. Anterior angle of pronotum slightly produced laterally, apex obtuse; elytra longer, ratio $l/w > 1.32$. Central Irian Jaya .... *bufo* Darlington
– Anterior angle of pronotum straight, apex acute; elytra shorter, ratio $l/w < 1.28$. Western central Irian Jaya .... *globulipenne* Baehr

16. Elytra usually trisetose, rarely unilaterally unisetose or bisetose; mandibles never straight and very elongate. Central Papua New Guinea .... 17.
– Elytra asetose, or unisetose, or bisetose; either mandibles straight and very elongate, or more or less fusiform species. Central and eastern Irian Jaya .... 20.

17. Posterior pronotal seta present .... 18.
– Posterior pronotal seta absent .... 19.

18. Margin of pronotum wide; wide, fusiform species. Bulldog Range .... *oodinum* Darlington
– Margin of pronotum narrow; rather narrow, barely fusiform species. Mt. Albert Edward .... *antecessor* Darlington

19. Pronotum wider, but less conical; elytra weakly iridescent. Mt. Wilhelm ...... *fortellum* Darlington
– Pronotum narrower, but rather conical; elytra markedly iridescent. Okapa .... *okapa* Darlington

20. Posterior pronotal seta present; elytra unisetose or bisetose .... 21.
– Posterior pronotal seta absent; elytra asetose .... 23.

21. Pronotum laterally regularly convex, base as wide as apex, basal angles rounded off, apex very protruding; elytra bisetose, anterior seta absent. Eastern central Irian Jaya .... *acuticolle* Baehr
– Pronotum laterally feebly convex, base much wider than apex, basal angles rectangular and obtuse, apex less protruding; elytra unisetose, only median seta present. Eastern Irian Jaya .... 22.

22. Apex of elytra not spinose, though sutural angle faintly denticulate, elytra slightly wider; pronotum barely narrowed towards base (Fig. 9). Area east of mountain range to the west of valley of Borme River .... *unipunctatum* Baehr
– Apex of elytra elongately spinose opposite 3rd interval, sutural angle not denticulate, elytra slightly narrower; pronotum distinctly narrowed towards base (Fig. 10). Area west of mountain range to the west of valley of Borme River .... *spinosum* Baehr

23. Mandibles not unusually elongate; apex of elytra distinctly spinose opposite 3rd interval; short and wide, markedly fusiform species. Central Irian Jaya .... *curtum* Baehr
– Mandibles straight and markedly elongate; apex of elytra not spinose; either rather elongate, not markedly fusiform species, or short and wide species with almost parallel lateral borders of pronotum .... 24.

24. Basal margin of elytra not interrupted at 3rd interval; prothorax $<1.8\times$ as wide as head .... 25.
– Basal margin of elytra interrupted at 3rd interval; prothorax $>2\times$ as wide as head .... 26.

25. Rather wide, almost parallel species; pronotum $>1.25\times$ as wide as long. Central Irian Jaya .... *forceps* Darlington
– Narrow, fusiform species with evenly rounded lateral margins of pronotum; pronotum c. $1.1\times$ as wide as long. Central Irian Jaya .... *formiceps* Darlington

26. Pronotum wider at base, ratio width of base/width of apex c. 1.8, sides more curved; elytra rather elongate. Central Irian Jaya .... *cychriceps* Darlington
– Pronotum narrower at base, ratio width of base/width of apex c. 1.65, sides more parallel; elytra rather short. Central eastern Irian Jaya .... *latum* Baehr

Updated key to the species of the genus *Collagonum* Baehr

1. Prothorax wide, though not distorted (Fig. 10). Eastern central Papua New Guinea *(Procollagonum)* .... *thoracicum*, spec. nov.
– Prothorax remarkably distorted (Fig. 11) .... 2.

2. Wings absent .... 3.
– Wings present (*Collagonum* s. str.) .... 6.

3. Eyes laterally abruptly produced; elytra asetose, or (rarely) unilaterally unisetose *(Paracollagonum)* .... 4.
– Eyes laterally not as abruptly produced; elytra trisetose (*Collagonum* s. str.) .... 5.

4. Both supraocular setae present; posterior pronotal seta present; frons conspicuously swollen. Central Papua New Guinea .... *distortum* (Darlington)
– Anterior supraocular seta absent; posterior pronotal seta absent; frons not swollen. Central Papua New Guinea .... *limum* (Darlington)

5. Both supraocular setae present; prothorax narrower, <1.5× as wide as long. Central eastern Irian Jaya .... *convexum* Baehr
– Anterior supraocular seta absent; prothorax wider, c. 1.7× as wide as long. Central Papua New Guinea .... *hornabrooki* (Darlington)
6. Both pairs of supraocular setae absent .... 7.
– At least posterior supraocular seta present .... 10.
7. Eyes laterally abruptly produced; pronotum at apex much narrower than at base. Central Irian Jaya .... *ophthalmicum* (Baehr)
– Eyes laterally not as abruptly produced; pronotum at apex only slightly narrower than at base . ... 8.
8. Both pronotal setae absent. Eastern Irian Jaya .... *robustum* Baehr
– Posterior pronotal seta present .... 9.
9. Elytra longer and narrower, ratio length/width 1.73; prothorax slightly wider, anterior angles less acute and less protruding (Fig. 11). Westernmost Papua New Guinea .... *longipenne*, spec. nov.
– Elytra shorter and wider, ratio length/width 1.60-1.63; prothorax slightly narrower, anterior angles acute and more protruding. Eastern Irian Jaya .... *riedeli* Baehr
10. Wider species; pronotum wider, laterally more rounded, with shorter, more convex anterior angles. Central Papua New Guinea .... *violaceum* Baehr
– Narrower species; pronotum narrower, laterally less rounded, with longer, more acute anterior angles. Central and eastern Irian Jaya .... *laticolle* (Baehr) 11.
11. Eyes smaller, laterally more abruptly protruding, almost devoid of distinct orbits. Area west of mountain range to the west of valley of Borme River .... *laticolle laticolle* (Baehr)
– Eyes larger, laterally less abruptly protruding, with distinct, oblique orbits. Area east of mountain range to the west of valley of Borme River .... *laticolle macrops* Baehr

Remarks

Even with the six species described as new in this present paper the number of species of the genera *Fortagonum* and *Collagonum* actually existing in New Guinea probably is not even approximately known. Apparently almost all mountain ranges have their own species, or even more than one, and very unusual species appear as the central ranges of New Guinea are more extensively sampled. Thus, it becomes more and more difficult to arrange the many differently shaped and structured species, if we are not willing to erect many new genera to master the high structural diversity.

In trying a proper arangement, the wing-and-setae-formulas that were firstly used by Darlington (1952) have proved increasingly useful. Hence, an attempt has been made in appendix 2 to arrange all species according to their wing-and-setae-formula. In addition to the development of wings and to chetotaxy, for the arrangement some additional character states were included, e.g. presence/absence of elytral spines, shape of mandibles, structure of aedeagus, shape of elytra and of pronotum.

Evidently these formulas are quite helpful in dividing the genera into (hopefully) natural groups that in the genus *Fortagonum* provisionally are called "species-groups", in the genus *Collagonum* are called subgenera. Apparently, in the latter genus the structural differences between the species of the subgenera *Procollagonum* and *Paracollagonum* are much greater than they are between the species-groups of the genus *Fortagonum*. But even in *Fortagonum*, the species-groups are believed to form monophyletic units, some of which could be raised to subgenera or even to genera when more evidence, or perhaps, additional species are at hand, that might clear up better the relationships within the genus.

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Appendix 1

Alphabetical checklist of the species of the genus *Fortagonum* Darlington

acuticolle Baehr, 1995	e. Irian Jaya
antecessor Darlington, 1971	c. Papua New Guinea
bigemum (Darlington, 1971)	c. Papua New Guinea
bisetosiceps Baehr, 1995	e. Irian Jaya
bufo Darlington, 1952	c. Irian Jaya
curtum Baehr, 1992	c. Irian Jaya
cychriceps Darlington, 1952	e. Irian Jaya
denticulatum Baehr, 1995	e. Irian Jaya
depressum Baehr, 1995	w. Irian Jaya
forceps Darlington, 1952	e. Irian Jaya
formiceps Darlington, 1971	e. Irian Jaya
fortellum Darlington, 1951	c. Papua New Guinea
globulipenne Baehr, 1998	w. Irian Jaya
hornabrookianum, spec. nov.	c. Papua New Guinea
insulare, spec. nov.	Japen I., w. Irian Jaya
laevigatum Baehr, 1998	w. Irian Jaya
laevissimum, spec. nov.	w. Papua New Guinea
latum Baehr, 1995	e. Irian Jaya
okapa Darlington, 1971	c. Papua New Guinea
oodinum Darlington, 1971	c. Papua New Guinea
sinak Baehr, 1998	w. Irian Jaya
spinipenne Baehr, 1998	w. Irian Jaya
spinosum Baehr, 1995	e. Irian Jaya
subconicolle (Darlington, 1971)	w. Irian Jaya
substriatum, spec. nov.	c. Papua New Guinea
unipunctatum Baehr, 1995	e. Irian Jaya

Alphabetical checklist of the species of the genus *Collagonum* Baehr

convexum Baehr, 1995	e. Irian Jaya
distortum (Darlington, 1971)	c. Papua New Guinea
hornabrooki (Darlington, 1971)	c. Papua New Guinea
laticolle laticolle (Baehr, 1992)	e. Irian Jaya
laticolle macrops Baehr, 1995	e. Irian Jaya

limum (Darlington, 1952)	c. Papua New Guinea
longipenne, spec. nov.	w. Papua New Guinea
ophthalmicum (Baehr, 1992)	c. Irian Jaya
riedeli Baehr, 1995	e. Irian Jaya
robustum Baehr, 1995	e. Irian Jaya
thoracicum, spec. nov.	c. Papua New Guinea
violaceum Baehr, 1995	c. Papua New Guinea

Appendix 2

Compilated wing-and-setae-fomulas of the species of the genera *Fortagonum* Darlington and *Collagonum* Baehr

(+: present; –: absent; – +: variable, or very small)

	posterior wings	elytral spines	suborbital setae		pronotal setae		elytral setae		
Genus *Fortagonum* Darlington									
acuticolle-group									
acuticolle Baehr	–	–	–	+	–	+	+	+	+
antecessor Darlington	–	–	–	+	–	+	+	+	+
oodinum Darlington	–	–	–	+	–	+	+	+	+
okapa Darlington	–	–	–	+	–	–	+	+	+
fortellum Darlington	–	–	–	–	–	–	+	+	+
bisetosiceps-group									
bisetosiceps Baehr	+	+	+	+	–	–	–	+	+
insulare, spec. nov.	+	+	–+	+	–	–	–	+	+
spinipenne Baehr	+	+	–	+	–	–	–	+	+
substriatum, spec. nov.	+	+	–	+	–	–	–	+	+
subconicolle (Darlington)	+	+	–	+	–	–	–	+	+
hornabrookianum, spec. nov.	+	+	–	+	–	–	–	+	+
laevissimum, spec. nov.	+	+	–	+	–	–	–	+	+
bigemum (Darlington)	+	+	–	+	–	–	–	+	+
denticulatum Baehr	+	+	–	+	–	–	–	+	–
depressum Baehr	+	+	–	–	–	–	–	+	+
sinak Baehr	+	+	–	–	–	–	–	+	–
unipunctatum-group									
unipunctatum Baehr	–	–+	–	+	–	+	–	+	–
spinosum Baehr	–	+	–	+	–	+	–	+	–
bufo-group									
curtum Baehr	–	+	–	+	–	–	–	–	–
formiceps Darlington	–	–	–	+	–	–	–	–	–
latum Baehr	–	–	–	+	–	–	–	–	–
bufo Darlington	–	–	–	–	–	–	–	–	–
cychriceps Darlington	–	–	–	–	–	–	–	–	–
forceps Darlington	–	–	–	–	–	–	–	–	–
globulipenne Baehr	–	–	–	–	–	–	–	–	–
laevigatum Baehr	–	–	–	–	–	–	–	–	–

Genus *Collagonum* Baehr									
Subgenus *Procollagonum*									
thoracicum, spec. nov.	–	–	–	–	–	–	–	–	–
Subgenus *Paracollagonum*									
distortum (Darlington)	–	–	+	+	–	+	–	–	–
limum (Darlington)	–	–	–	–	–	–	–	–+	–
Subgenus *Collagonum* s. str.									
convexum Baehr	–	–	+	+	–	+	+	+	+
laticolle laticolle (Baehr)	+	–	–	+	–	+	+	+	+
laticolle macrops Baehr	+	–	–	+	–	+	+	+	+
violaceum Baehr	+	–	–	+	–	+	+	+	+
hornabrooki (Darlington)	(?)–	–	–	+	–	–	+	+	+
longipenne, spec. nov.	+	–	–	–	–	+	+	+	+
riedeli Baehr	+	–	–	–	–	+	+	+	+
ophthalmicum (Baehr)	+	–	–	–	–	+	+	+	+
robustum Baehr	+	–	–	–	–	–	+	+	+

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About *Andricus polycera* (Giraud, 1859) and related forms, with special remarks on *Andricus polycera* and *A. subterranea*

(Insecta, Hymenoptera, Cynipidae)

David Bellido & Juli Pujade-Villar

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In this paper the status of the *polycera* group of species is studied. Two new synonyms are established: *A. polycera* (= *A polycera transversa*, syn. nov.) and *A. subterranea* (= *A. trinacriae*, syn. nov.) and new characters and problems for the separation of the two species are commented. *A. marchali* is considered as a probable valid species with uncertain status. Reasons leading to these conclusions are commented. Finally, *A. polycera* is definitively removed from the Iberian gall wasp fauna.

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Introduction

Andricus polycera and *A. subterranea* were originally described as two closely related species of the genus *Cynips* by Giraud (1859). Mayr (1870) examined Giraud's material and considered *Cynips subterranea* as a mere variety of *C. polycera* which was followed by posterior authors (Kieffer 1897-1901, Houard 1908, Dalla Torre & Kieffer 1910, Ionescu 1957, Ambrus 1974, Vassileva-Samnalieva 1983). According to these authors the two forms could be separated by chromatic differences and gall morphology.

Material and methods

Type series of *A. polycera* and *A. subterranea*, from the Giraud's collections deposited in MNHN, Paris were studied and lectotypes established. All descriptions of these forms in the literature have been revised and the Vilarrúbia collection, deposited in the Zoological Museum of Barcelona, was studied. SEM pictures have been made without coating and at low voltage to prevent any risk for the specimens.

Results and discussion

Adults of both forms present a high morphological similarity, although *A. subterranea* individuals are normally darker, especially in their antenna and tibiae. Colour in cynipids is highly variable, so it is not rare to find black forms within a normally brown species (Bellido, Melika & Pujade-Villar, in prep.). Moreover, some cynipids also change their colour depending on the host where they have been reared from (Pujade-Villar et al, in press) and even from different organs of the same host plant (Pujade-Villar 1991).

Tavares (1931) again raised *A. subterranea* to species rank and gave additional characters to separate it from *A. polycera*: antennal segment lengths different in both species, tarsal claws of *A. subterranea* with a longer basal lobe, differences in pubescence of lateral part of the mesosoma and also in median mesoscutal impression. However, none of these characteristics are sufficient for the separation of the two forms, and no clear differences are evident following Tavares' characters. In the same paper Tavares recorded this species from Spain through material collected by Vilarrúbia, in Balenyà (Barcelona, NE Spain), and this species is also recorded in Vilarúbia (1930). However, these records do not belong to *A. polycera*, as Nieves-Aldrey (1987) suggested. *Andricus polycerus* pictures in Tavares' paper belong to an *A. kollari* gall with protuberances, and two galls found at Vilarrúbia's collection in the Zoological Museum of Barcelona are *A. quercustozae* galls probably deformed by a parasitoid attack in their first developmental stages. In north-eastern Iberian Peninsula we have repeatedly observed similar galls, normally in oaks highly attacked by *A. quercustozae*. Therefore this species is definitively excluded from the Iberian gall wasp fauna list.

Galls of *A. polycera* and *A. subterranea* are also very similar, although they normally are considered to be different. *A. polycera* galls are found in aerial buds of *Quercus petraea*, *Q. robur* and *Q. humilis*, preferentially on younger, shrub-sized trees (Csóka 1997), while *A. subterranea* is found on subterranean stems or rhizomae of the same oaks, normally hidden by a thin layer of litter above them. Moreover, *A. subterranea* galls are shorter, softer, more irregular and without long protuberances in their apex. Records of *A. subterranea* in Ionescu (1957) and Ambrus (1974) are interesting, since galls in the pictures seem to have appendices in their superior part, like in *A. polycera*, while in typical galls of *A. subterranea* these extensions are not present. Some differences between these two galls could be attributed to their position. Subterranean galls find moister conditions which probably made them softer, and perhaps the other differences, like the absence of protuberances or the smaller height, could also be explained by developmental constraints of their subterranean habitat. On the other hand, height and length of apical expansions of *A. polycera* galls are variable, and subterranean galls may only represent an extreme of this variation.

Other species of cynipids can be found at subterranean and aerial organs, although these misplacements occur more or less frequently, depending on the species. This duality in location has been observed in *Trigonaspis megaptera*, *Andricus sieboldi* (ag. gen.) and *Plagiotrochus kiefferianus* (ag. gen.) (Pujade-Villar, pers. obs.). There is also a slight difference of emergence between *A. polycera* and *A. subterranea*: while the first appears from end of October to beginning of November, *A. subterranea* is seen in middle of November (Giraud 1859). This variance can be explained by habitat differences and has been observed in *Plagiotrochus kiefferianus* (Pujade-Villar, unpublished data).

From all these observations it would seem that these two species are identical, and the galls then would represent only extremes of variation. However, studies of adults also shows some morphological differences and so they do not support this hypothesis, as will be discussed below.

After examination of the type series of both species deposited in the Giraud's collection from MNHN, Paris, we have concluded that these two species are very similar morphologically, but we have found some differences in propodeum pubescence: In *A. polycera* the propodeal area (Fig. 1a) is only slightly pubescent and normally limited to the superior corners while in *A. subterranea* the propodeum (Fig. 1b) normally is densely pubescent and occupies the whole propodeum, reaching always the nucha. This character is less obvious in some adults but always both forms can be separated. In the type series of *A. polycera* there is also a perceptible chromatic variation, including some darker individuals which are relatively similar to typical *A. subterranea* adults, but all studied *A. subterranea* adults are darker, and although this chromatic aspect is not useful alone, it could be helpful in the separation of the two forms. Further studies could demonstrate that all variability falls inside the intraspecific rank, but considering the small differences between other species of cynipids (i.e. in the *A. kollari* group), we think it better to maintain the specific status of both forms.

Three other varieties of *A. polycera* are known: *A. polycera transversa* Kieffer, *A. polycera trinacriae* Stefani and *A. polycera marchali* Kieffer. Unfortunately, the Stefani collection was lost during 2nd World War (Horn et al. 1990) and the Kieffer collection is very dispersed and the location of many types is unknown, or they were lost by different reasons, because Kieffer used to return the material to the collectors. The current status of Kieffer's taxa should be considered as doubtful, since they can represent valid species or forms or not. Tavares (1931) treated *A. polycera transversa* and *A. polycera trinacriae* as a subspecies of *A. polycera*; he also recorded the high similarity of *A. polycera trinacriae* galls with those of *A. subterranea* (according to Mayr), and that there were no differences between these



Fig. 1. Propodeal area of *Andricus polycera* (**a**) and *A. subterranea* (**b**).

forms and the typical one. Therefore, *A. polycera trinacriae* is probably a synonym of *A. subterranea* and *A. polycera transversa* is probably a synonymic name of *A. polycera,* given the high variability of galls of these species. Finally, Tavares considered *A. polycera marchali* as a different species because of differences in mesoscutum sculpture, relative length of antenna and hypopygial spine, among others. In this case, again type material is not available, because the location of Kieffer's types is unknown, and the Tavares collection was destroyed during a fire which affected great parts of Lisboa in the last century. However, according to his paper, the material examined was sent by Marchal, who collected the gall described by Kieffer, and which came from the same zone. Therefore, we consider that it actually represents a different species, especially in view of its gall morphology, and that it is rather remotely related to other forms of *A. polycera.* In this case Tavares' characters could be used for the separation of this species.

Conclusions

- *Cynips polycera* Giraud, 1859. Lectotype: agamic ♀, (deposited in MNHN), here designated (examined). "Museum Paris 4- C. polycera Aust. G. Coll. Giraud" (white label); "Cynips polycera, typical series" (white label); "Lectotype" (red label); "Andricus polycera (Giraud), Bellido & Pujade-Villar det.-1999" (white label). Paralectotypes: 39 agamic ♀♀, 4 galls. Same data of lectotype, emergence dates: 25th March (1♀, extracted from the gall), 20th June (3♀♀), 18th August (12 specimens), 28th August (12♀♀), no additional data (11♀♀, one of them with a white label "4 Cynips polycera G. Aust. G"); material deposited in MNHN except 5 adults in Barcelona University.
- *Cynips polycera* var. *transversa* Kieffer, 1897. Syn. nov. of *A. polycera* (not examined).
- *Cynips subterranea* Giraud, 1859. Lectotype: agamic ♀, (deposited in MNHN), here designated (examined). "5 Cynips subterranea G. aust. G" (white label", "Museum Paris, Coll. Giraud" (white label), "Cynips subterranea, typical series" (white label), "Lectotype" (red label), "Andricus subterranea (Giraud), Bellido & Pujade-Villar det.-1999" (white label). Paralectotypes: 22 agamic ♀♀, 2 galls. Same data of lectotype but without the first label; emergence dates: 12th September (8 specimens), 15th September (2 specimens), 20th September (6 specimens), 4th November (6 specimens), material deposited in MNHN except 3 adults in Barcelona University.
- *Cynips trinacriae* Stefani, 1906. Syn. nov. of *A. subterranea* (not examined).
- *Cynips polycera* var. *marchali* Kieffer, 1897. Incertae sedis. Probably a valid species, *A. marchali* (Kieffer, 1897)

Key to the valid species of the *A. polycera*-group

1. Propodeal area normally only slightly pubescent, and hairs restricted to its superior part, never reaching nucha (Fig. 1a). Colour variable, but normally brown. Galls in aerial buds of deciduous oaks, variable in height and in length of apical protuberances. .... *A. polycera* Giraud

- Propodeal area normally strongly pubescent and hairs reaching nucha (Fig. 1b), adults normally darker, especially in their antenna and tibiae. Subterranean galls shorter, softer, more irregular and without apical expansions. .... *A. subterranea* Giraud

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A peculiar evolutive lineage of the uncus in the genus *Catada* Walker, [1859] 1858

(Lepidoptera, Noctuidae, Hypeninae)

Martin Lödl

Lödl, M. (2001): A peculiar evolutive lineage of the uncus in the genus *Catada* Walker, [1859] 1858 (Lepidoptera, Noctuidae, Hypeninae). – Spixiana **24/1:** 77-84

A distinct and aberrant lineage of unci within the genus *Catada* Walker, [1859] 1858 is discussed as one of the rare examples of a continous documentation of the evolutive development from plesiomorphic to apomorphic features. A brief description of the genitalic features of the genus is given. The phylogeny of the major part of the species set of the genus is presented.

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Introduction

The genus *Catada* was described by Walker in [1859] 1858 based on the species *Catada glomeralis* Walker, [1859] 1858 in the family "Herminidae". This species was described in the same publication on a previous page as *Bocana vagalis* Walker, [1859] 1858. Both taxa are coming from Sri Lanka.

The exact systematic position of *Catada* remains unclear, although it is traditionally placed in the Hypeninae. A redescription and illustration of the type species of the genus *Catada* and a commented list of species based on Poole (1989) were given in Lödl (1999b). Derived African species have been reported in Lödl (2000). The relationship to the genus *Nolasena* Walker, [1858] 1857 is also under discussion (Lödl 1999a).

The male genitalia of *Catada* can be characterised with the following punctation (Fig. 14):

- The uncus region is complex, consisting of an aberrant uncus and a claw like scaphium of the anal cone.
- The tegumen is slim and slender, forming a swelling from the ventral side.
- The anellus is a skinny glove covered with spines.
- The valves are skinny and divided into two big lobes at the distal end or simple and wear a bristle covered lobe in the middle, protruding in the lumen of the genital corpus.
- The sacculus is well developed and forms a giant, flabby eversible tube (coremata!), which is densely covered with very long hair-like scales. There are three centres of density of hairs: one ventrally at the base, covered with the longest hairs, one on the dorsal margin in the distal third and one at the distal tip.
- The vinculum is insignificant, rounded and is not exceeding the length of the remaining genitalia corpus proximally.
- The aedeagus is a slender, more or less straight tube with a blunt distal end.

Material and Methods

This study was carried out with conventionally dried specimens from the collections of The Natural History Museum (BMNH) in London, the Naturhistorisches Museum Wien (NHMW) and the Muséum national d'Histoire Naturelle (MNHN) in Paris. Genitalia preparations have been made in the traditional way (mazeration by use of KOH, preparation and isolation of the genitalia tract). The genitalia have been stained with Chlorazol Black.

The SEM investigations were carried out by using conventionally prepared specimens (alcohol and as a final stage 99,9 % cooled aceton), coated with gold, on a Jeol 6000/400.

List of species investigated

Base of the investigation is a set of *Catada*-species (type locality in square brackets; deposit of types in normal brackets):

Catada antevorta (Viette, 1958) [Madagascar] (MNHN)
Catada canaliferalis (Moore, 1877) [Andaman Islands] (BMNH)
Catada charalis Swinhoe, 1900 [Australia, Queensland] (BMNH)
Catada ndalla Bethune-Baker, 1911 [Angola] (BMNH)
Catada obscura Joannis, 1906 [Mauritius] (BMNH)
Catada phaeopasta Hampson, 1909 [Uganda, Ruwenzori] (BMNH)
Catada renalis (Moore, 1882) [India, Khasia Hills] (BMNH)
Catada transversalis (Moore, 1877) [Andaman Islands] (BMNH)
Catada vagalis (Walker, [1859] 1858) [Sri Lanka] (BMNH)

The type specimens of the species have been examined.

The SEM investigation is based on:
Hypena varialis Walker, [1866] 1865 [Sierra Leone] (NHMW) (SEM study)

Abbreviations

BMNH	The Natural History Museum, London
MNHN	Museum National d'Histoire Naturelle, Paris
NHMW	Naturhistorisches Museum, Wien
sc	scaphium
scl	length of scaphium
ta	tuba analis
te	tegumen
u	uncus

Results

Normally the decision if the state of a feature of the copulatory system is plesiomorphic or apomorphic is a very delicate one. A typical hook-shaped uncus as it is found in the genus *Hypena* Schrank, 1802 is illustrated in fig. 1. The transformation of the uncus from hook shaped to aberrantly helmet shaped with a lace of sclerotized teeth within the genus *Catada* is documented in this paper. The hook shaped state of the uncus in the African species *Catada phaeopasta* Hampson, 1909 is clearly the plesiomorphic condition (Figs 2-5).

The transformation of this character follows three steps:

1. A big uncus with two rounded knees, hook shaped with several sclerotized teeth-like setae on the ventrolateral middle of the uncus. The uncus tip also with some sclerotized teeth. The dorsal margin is poor in hair-like scales (Figs 2-5).
2. A more or less rounded uncus with a flattened distal part. Two areas of teeth-like setae are found. One is formed like a tonsure at the distolateral part of the uncus, one is formed as a row of setae situated ventrolaterally. The hair-like scales of the dorsal margin are confined to the distal part of the uncus (Figs 6-7, 15).

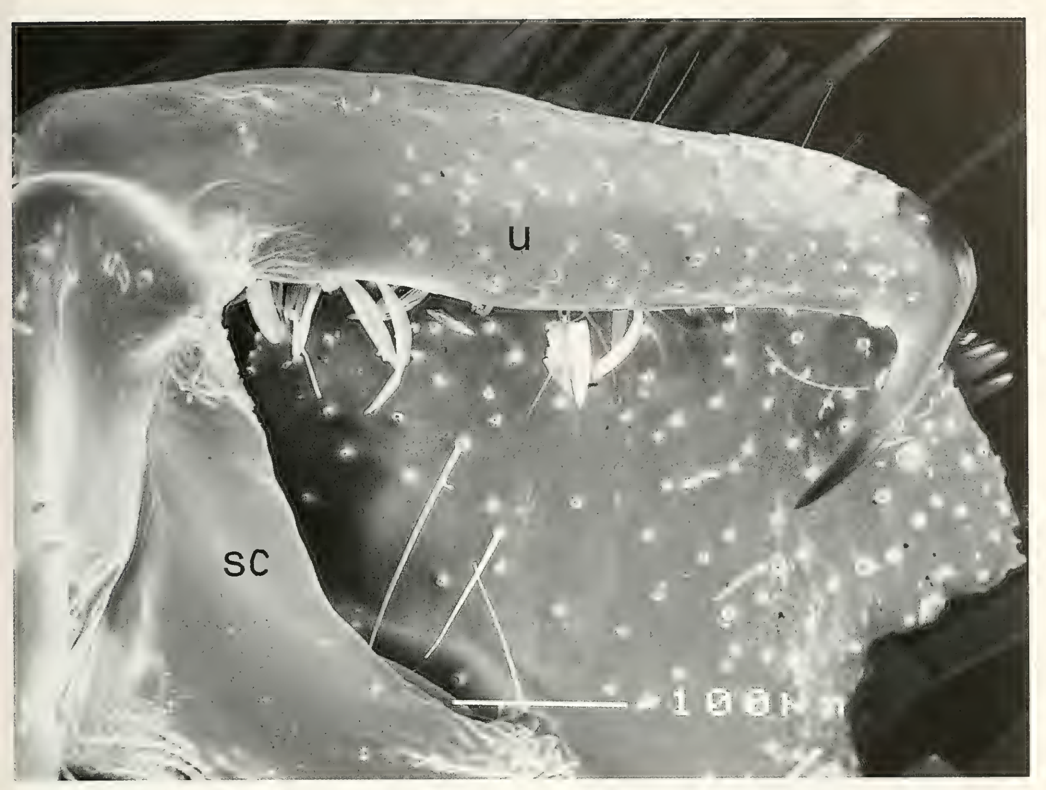
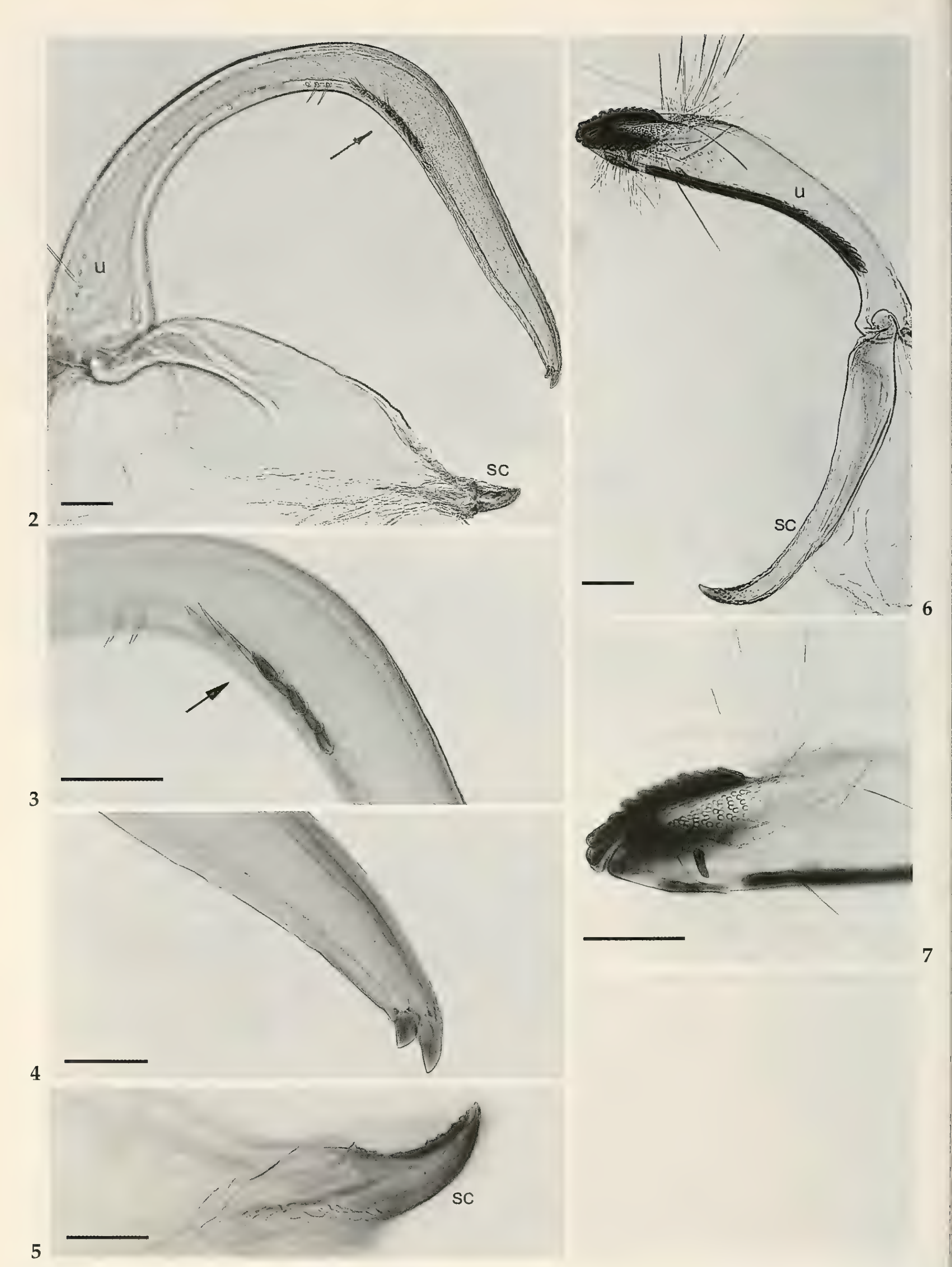


Fig. 1. Uncus-scaphium-device in *Hypena varialis* Walker, [1866] 1865; SEM. – *sc* scaphium; *u* uncus.

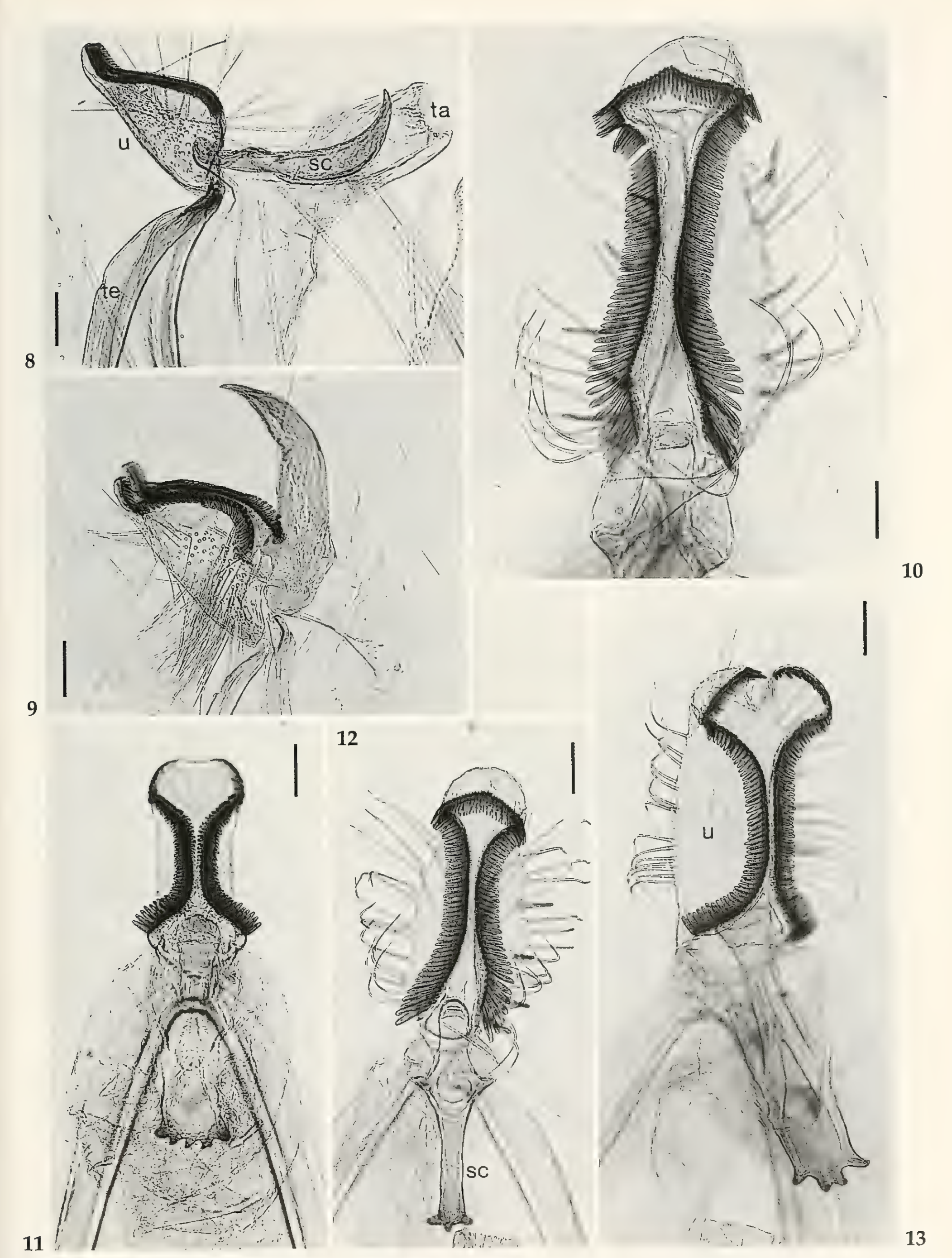
3. Completely aberrant uncus, like a helmet with a slim and rounded distal part and a blown up basal part. Both setae areas are linked together to a lace of sclerotized teeth forming a trimming along the ventrolateral margin of the uncus. The dorsal margin is rich in hair-like scales (Figs 8-13).

There is a clear lineage from the plesiomorphic state "hook-shaped" uncus to an extraordinarily aberrant "helmet-shaped" uncus. The feature "lace of teeth-like setae" is starting with a few small teeth in the most primitive form: *C. phaeopasta*, *C. transversalis* and *C. antevorta* (Viette, 1958) represent a clear intermediate with three separated areas of teeth-like setae on the uncus. One field at the distal area and two fields at both ventrolateral margins. The mostly evolved species show a completed lace of strong teeth-like setae. This lace strictly follows the ventrolateral margin of the uncus and forms a distinct bend at the distal end of the helmet. A phylogeny of the involved *Catada*-species – mainly based on characters of the male copulatory system – is given in fig. 16.

Around the uncus occur different accessory or associated structures. These structures are difficult to define and quite different from species to species. The genus *Catada* exhibits a well developed scaphium. According to Tuxen (1956) a scaphium is a sclerotization of the dorsal part of the anal tube. "Anal tube" is used here as the commonplace term. According to Kristensen (i.l.) the terminal postgenital region which bears the anus as the apical element of the alimentary canal should be referred to as the "anal cone". This differentiation may be relevant to point out that the sclerotizations affect the postgenital wall surrounding the terminal digestive tract and not the digestive tube itself. These sclerotizations seem to have either a function in protecting the skinny sector of anal cone and anal tube (s.str.) from fine pointed terminal hooks of the unci and in keeping the uncus in a pocket-knife resting position (Lödl, in preparation). The scaphium of *Catada* represents the same interesting evolutive progression as the uncus does. The primitive state is just a corium-like dorsal surface of the anal cone with a strong terminal tooth (*C. phaeopasta*; fig. 5). The intermediate forms (*C. transversalis*, *C. antevorta*, figs 7, 15) exhibit long, strongly sclerotized, claw-like scaphia. The derived species have the claw-like



Figs 2-7. Plesiomorphic states of unci of *Catada* sp.; scale = 0.1 mm. **2-5**. *Catada phaeopasta* Hampson, 1909. Holotype, Noctuidae Brit. Mus. slide No. 16508. **2.** Uncus (*sc* scaphium; *u* uncus), arrow indicates primary teeth-like setae on the ventral margin of uncus. **3.** dto. – enlarged. **4.** Tip of uncus with teeth-like sclerotizations. **5.** Scaphium. **6-7**. *Catada transversalis* (Moore, 1877). Noctuidae Brit. Mus. slide No. 16503. **6.** Uncus and scaphium. **7.** Terminal end of uncus with corona of teeth.



Figs 8-13. Advanced uncus characters of *Catada* sp., scale = 0.1 mm. **8**. *Catada vagalis* (Walker, [1859] 1858); Noctuidae Brit. Mus. slide No. 16027. **9.** *Catada charalis* Swinhoe, 1900. Lectotype, Noctuidae Brit. Mus. slide No. 16504. **10.** *Catada obscura* Joannis, 1906. Noctuidae Brit. Mus. slide No. 16512. **11.** *Catada canaliferalis* (Moore, 1877). Noctuidae Brit. Mus. slide No. 16489. **12.** *Catada ndalla* Bethune-Baker, 1911. Noctuidae Brit. Mus. slide No. 16509. **13.** *Catada renalis* (Moore, 1882). Noctuidae Brit. Mus. slide No. 16507. Abbreviations: *sc* scaphium; *ta* tuba analis; *te* tegumen; *u* uncus.

14



15

Figs 14-15. Male genitalia of *Catada antevorta* (Viette, 1958). Holotype, Viette prep. 3283. **14.** Genitalia total, sacculus coremata fully everted, aedeagus in situ. Scale = 0.5 mm. **15.** Uncus-scaphium-complex (*sc* scaphium; *te* tegumen, *u* uncus). Scale = 0.1 mm.

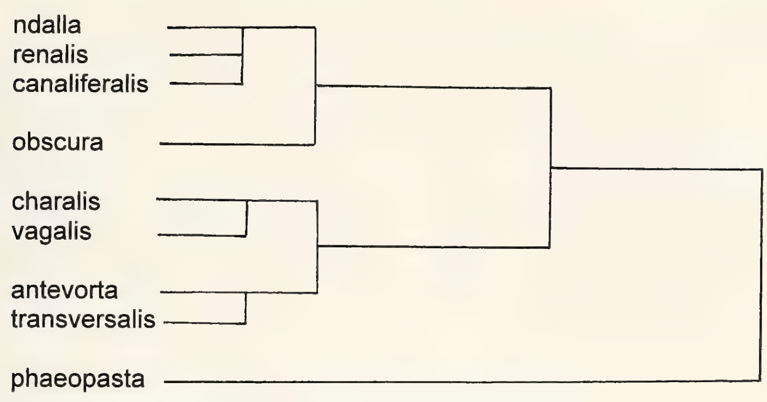


Fig. 16. Phylogeny of the species of the genus *Catada* involved in this study.

type (e.g. *C. vagalis*, figs 8-9) as well as the fork-like type (Figs 11-13). The flat, fork-like type with rounded pronges inserts with a rounded base directly at the uncus base and can wear a pair of lappets at the basal third which insert in a skinny bulbus at the articulation of tegumen and uncus. These lappets are possible insertions of the muscles 9DV1 and 9 VL1. The first is the longitudinal muscle of the 9th segment arising on the lateral edge of the tegumen and inserting on the sclerotizations around the anal cone (Eaton 1984). The latter is a ventrolongitudinal muscle of the 9th segment and arises from the sclerotized, dorsal parts of the diaphragma and also inserts at the sclerotizations around the anal cone (Eaton 1984). The middle of the "fork" shows a loop-like window in the sclerotization. This area is weaker and covered by soft tissue. The function is unclear. Form and situation of this loop are of specific value.

The cooperation between the helmet-shaped uncus of the derived *Catada*-species and the claw- or fork-like scaphia during the mating behaviour is highly speculative. A clasping mechanism is also possible as a pushing mechanism. The author assumes a clear function in controlling the uncus during the resting behaviour. This is supported by the obvious correlation of the scaphium length and the uncus length. Even the protection of the skinny anal cone in the derived species seems to be not necessary, the possession of a scaphium could be a plesiomorphic feature itself. The primitive type *(C. phaeopasta)* with long and hook-shaped uncus clearly requires a contrasting feature which is found in a knob- and teeth-covered sclerotization of the terminal region of the anal cone. The more derived species with flat and fork-like scaphia with rounded pronges could insert in the extended terminal area of the helmet-shaped uncus. A prevention of the anal tube from being pierced by a fine-pointed uncus is clearly not necessary. The corresponding features on the copulatory tract of the females are very difficult to locate. In contrast to the males, the females have quite average noctuid genitals (Lödl 1999b). The genus *Catada* is an Old World genus with a distribution from the tropical Africa to Australia. Although the distribution pattern and its evolutive development still remain unclear one can assume the origin of the primitive *Catada*-taxa in Equatorial Africa. Species with really plesiomorphic states have not been found in the Oriental and Australian region so far. *C. antevorta* and *C. transversalis* as the intermediate species occur on islands: Madagascar and the Andaman Islands.

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When molecules claim for taxonomic changes: New proposals on the classification of Old World treefrogs

(Amphibia, Anura, Ranoidea)

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Vences, M. & F. Glaw (2001): When molecules claim for taxonomic changes: New proposals on the classification of Old World treefrogs (Amphibia, Anura, Ranoidea). – Spixiana **24/1:** 85-92

Recent phylogenetic data, mainly based on mitochondrial DNA analyses, indicate that current classification of neobatrachian anurans is in need of revision. In the present paper, we review the literature pertaining the molecular and morphological phylogeny of Old World treefrogs. The molecular phylogenies indicate that, among non-hyperoliid Old World treefrogs, one clade is formed by the endemic genera from Madagascar, and a second one by the Asian and African genera. Both these lineages are nested within the family Ranidae sensu Blommers-Schlösser (1993), but their relationships to each other are not unambigously resolved. We propose to consider the Asian-African lineage as family Rhacophoridae and the Malagasy lineage as family Mantellidae. Together with the (paraphyletic) family Ranidae, these two families form the epifamily Ranoidae. Three epifamilies (Arthroleptoidae, Microhyloidae, and Ranoidae) form the superfamily Ranoidea. Within the family Mantellidae, three subfamilies are recognized: Mantellinae (genera *Mantella* and *Mantidactylus*), Boophinae new subfamily (genus *Boophis*), and Laliostominae new subfamily (genera *Laliostoma* and *Aglyptodactylus*). The new classification accounts better for the evolutionary relationships of ranoid frogs and furthermore allows for a classification of the involved Malagasy groups in agreement with their phylogeny. A satisfactory classification of the whole group, however, will only be possible with increased phylogenetic knowledge, and will probably include a further partition of the Ranidae.

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1. Introduction

The phylogenetic relationships of Old World treefrogs have been subject of intensive debate during the past decades. First all classified in a family Polypedatidae (e. g. Ahl 1931, Noble 1931, as opposed to the unrelated treefrog family Hylidae with a largely Neotropical distribution), Laurent (1951) noted that one group, which he defined as Hyperoliidae, was osteologically very different from the remaining taxa (placed into the Rhacophoridae or Rhacophorinae). The important differences between these two groups were emphasized later in the phylogenetic approaches of Liem (1970), Drewes (1984) and Channing (1989). However, Laurent (1951, 1986) also noted that, while hyperoliids share several

symplesiomorphies with some African genera formerly considered as basal representatives of the Ranidae (and today seen as own families, Arthroleptidae and Astylosternidae; see Dubois 1992), rhacophorines shared synapomorphies with more derived representatives of the extremely diverse and speciose family Ranidae. Actually, rhacophorids are only distinguished from other ranids by the presence of an intercalary element between ultimate and penultimate phalanges of fingers and toes, and by generally (but not consistently) more arboreal habits. Based on the synapomorphies identified (e.g., presence of a bony sternal style), Laurent (1986), Dubois (1992) and Blommers-Schlösser (1993) proposed to include the Rhacophoridae as subfamily Rhacophorinae in the family Ranidae. However, the proposal of Blommers-Schlösser (1993) (i. e. the definition of the family Ranidae as group containing almost all ranoid taxa with an ossified sternal style) is all but generally accepted by herpetologists. Most authors continue considering the Rhacophoridae as separate family (e.g., Frost 1985), a view also shared by internet databases (as the Amphibian Species of the World database, Amphibiaweb, Tree of life, Genbank; as of 10 November 2000). Furthermore, new names such as "fanged frogs" (Emerson & Ward 1998, Emerson et al. 2000a) and "boophids" (Richards et al. 2000) have been used to address ranoid subclades, without a nomenclatural formalization of these groups.

In the last few years, numerous new results on Old World treefrog phylogeny have been published, several of them referring to the taxa endemic to Madagascar. In the present paper, we will outline the main conclusions that can be drawn from a comprehensive view of the new results, and propose a partly modified classification which better reflects the phylogenetic relationships among ranoid frogs than the previous schemes. We here focus on only a small subset of this speciose group, namely the non-hyperoliid Old World treefrogs (Rhacophorinae and Mantellinae sensu Blommers-Schlösser 1993). Further classificatory modifications will successively become necessary with the accumulation of new data on ranoid groups such as the Hyperoliidae and the Microhylidae.

2. Summary of recently published molecular data on Old World treefrogs

DNA sequences of ranoid frogs have been analyzed in the context of higher-level phylogenies by Hillis et al. (1993), Hedges & Maxson (1993), Hay et al. (1995), Ruvinsky & Maxson (1996), and Vences et al. (2000a). More particular aspects were studied by Bossuyt & Milinkovitch (2000), Emerson & Ward (1998), Emerson et al. (2000a,b), Feller & Hedges (1998), Marmayou et al. (2000), Richards & Moore (1996, 1998), Richards et al. (2000), and Vences et al. (2000b,c). The dissertation of Vences (1999) contains a number of crucial results which are partly published (Vences et al. 2000a,b,c) or in progress of publication (Vences et al. submitted). Wilkinson & Drewes (2000) furthermore undertook a re-analysis of non-molecular characters of Old World treefrogs. Altogether, the new data allowed for the identification of a number of well-supported monophyletic goups, while other splits were much less clearly resolved (compare Fig. 1):

1. Within the derived and monophyletic group of the Neobatrachia (sensu Feller & Hedges 1998), one clade containing exclusively groups with a firmisternal shoulder girdle is identified as monophyletic by all available molecular data (Hillis et al. 1993, Maxson et al. 1993, Hay et al. 1995, Ruvinsky & Maxson 1996, Emerson et al. 2000a, Vences et al. 2000a). This clade includes the Ranidae (with Rhacophorinae and Mantellinae), Microhylidae, Hemisotidae, Hyperoliidae, Arthroleptidae, and Astylosternidae. It does not include several other Neobatrachian groups which apparently evolved a firmisternal or pseudofirmisternal shoulder girdle independently: some leptodactylids, "atelopodine" bufonids, sooglossids and dendrobatids (Duellman & Trueb 1986, Hay et al. 1995, Ruvinsky & Maxson 1996, Graybeal 1997, Vences et al. 2000a).
2. Within the firmisternal clade as defined above, one basal radiation led to the differentiation of the families Microhylidae, Hemisotidae, Hyperoliidae, Arthroleptidae, Astylosternidae, and Ranidae (sensu Blommers-Schlösser 1993). Relationships between all these families are not well resolved, and some (especially Microhylidae and Hyperoliidae) may not be monophyletic (e.g. Emerson et al. 2000a). However, one group containing all or most forms characterized by a bony style of the sternum (Ranidae sensu Blommers-Schlösser 1993, including Rhacophorinae and Mantellinae) appeared as rather well supported monophyletic group in Emerson et al. (2000a) and Vences (1999).
3. A second large and probably explosive radiation led to the differentiation of the more than 980 species in 54 genera (Glaw et al. 1998a) included in the Ranidae sensu Blommers-Schlösser (1993). Again, relationships between the different clades of this radiation can not yet be unequivocally

resolved (Emerson et al. 2000b, Vences et al. 2000c). However, two treefrog clades are well defined by molecular synapomorphies:

- A clade endemic to the Madagascan region which is composed of the genera *Boophis* (Rhacophorinae), *Mantella* and *Mantidactylus* (Mantellinae), *Laliostoma* (formerly *Tomopterna;* Raninae) and *Aglyptodactylus* (Rhacophorinae, Mantellinae or Raninae) (Richards & Moore 1998, Glaw et al. 1998b, Richards et al. 2000, Bossuyt & Milinkovitch 2000, Vences et al. 2000b, Vences et al. submitted).
- A clade with representatives in Africa and Asia which contains the genera classified in the Rhacophorinae except the Malagasy *Boophis* (Richards & Moore 1998, Emerson et al. 2000a, Richards et al. 2000, Vences et al. submitted).

3. Problems in the classification of Malagasy ranoids

The endemic, non-hyperoliid and non-microhylid ranoid frogs endemic to the Madagascan region have generally been classified in three subfamilies or families (Frost 1985; Blommers-Schlösser & Blanc 1991; Duellman 1993). The phylogenetic results outlined above show that none of the discussed classifications is fully satisfactory.

- *Laliostoma labrosum* was included in the genus *Tomopterna* and the subfamily Raninae or Tomopterninae until recently (Dubois 1992, Glaw et al. 1998b). Molecular studies of Vences et al. (2000b) revealed that the three geographic groups of *Tomopterna* (Africa, Madagascar, southern Asia) are not closely related (see also Bossuyt & Milinkovitch 2000), and should be included in different genera – *Laliostoma* being the monotypic Malagasy genus. Richards & Moore (1998) found that *Mantidactylus, Mantella, Boophis, Aglyptodactylus* and *Laliostoma labrosum* are a monophyletic clade, and suggested that the latter is a rhacophorid. *Laliostoma* is the only endemic ranoid from Madagascar without an intercalary element.
- *Aglyptodactylus* has mostly been considered as belonging to the Rhacophorinae (Blommers-Schlösser 1993), but has sometimes also been included in the Mantellinae (Channing 1989). Glaw et al. (1998b) found that *Aglyptodactylus* and *Laliostoma labrosum* are closely related based on non-molecular characters although both were traditionally classified in different subfamilies. To remove this classificatory inconsistency they transferred *Aglyptodactylus* to the Raninae. Extended data sets of non-molecular characters (Vences et al. in prep.) and molecular data (Vences et al. 2000b and submitted) confirm close relationships of *Aglyptodactylus* and *Laliostoma.*
- The genera *Mantella* and *Mantidactylus* form the subfamily Mantellinae (a third taxon, *Laurentomantis,* is considered as one out of 12 subgenera of *Mantidactylus*; Glaw & Vences 1994). This clade is well defined by ethological synapomorphies (reduction of strong mating amplexus; egg deposition outside of water). The Mantellinae were either included in the Rhacophoridae (Channing 1989) or Ranidae (Frost 1985, Blommers-Schlösser 1993, Glaw et al. 1998b), or seen as own family Mantellidae (Blommers-Schlösser & Blanc 1991, Dubois 1992).
- The genus *Boophis* has generally been included in the rhacophorines which are either considered as subfamily Rhacophorinae of the Ranidae (e.g. Blommers-Schlösser 1993) or as family Rhacophoridae (e.g. Frost 1985).

4. A new classificatory scheme of the superfamily Ranoidea

The data summarized above clearly corroborate Duellman & Trueb's (1986) statement that ranid systematics are "in a state of chaos" and demonstrate the need of an update of the classificatory scheme. The molecular data indicated the presence of multiple para- and polyphyletic taxonomic units within ranid frogs (e.g. Emerson et al. 2000a, Vences et al. 2000b). The main goal to be achieved in ranid systematics in the near future is, in our opinion, a classification void of polyphyletic taxa, and without or with only a small number of paraphyletic taxa.

Several authors have followed a strategy to exclude small, well corroborated monophyletic groups from large catch-all groups, as a first contribution to a partition of these large groups into monophyletic units (e.g. Drewes 1985). We here consider the same approach as useful for the case of the family

Ranidae which is large and diverse enough to be partitioned into several families. Largely based on the scheme of Dubois (1992), we propose:

- to consider the taxa joined in the Ranidae by Blommers-Schlösser (1993) as epifamily (sensu Dubois 1992) Ranoidae.
- to join the families Arthroleptidae, Astylosternidae and Hyperoliidae in an epifamily Arthroleptoidae, and the families Hemisotidae and Microhylidae in an epifamily Microhyloidae. The monophyly of the Ranoidae appears rather well assessed, while the monophyly of the remaining two epifamilies is questionable at current state (but not contradicted by any relevant data sets).
- to recognize, within the Ranoidae, a family Rhacophoridae beside the Ranidae. This family Rhacophoridae contains the Asian and African rhacophorine genera but not the Malagasy *Boophis.*
- to recognize, within the Ranoidae and beside the Ranidae and the Rhacophoridae, a family Mantellidae, which contains the endemic Malagasy genera *Mantella, Mantidactylus, Boophis, Aglyptodactylus* and *Laliostoma.*
- to subdivide the Mantellidae into the following three subfamilies which correspond to three monophyletic groups (Richards & Moore 1998, Bossuyt & Milinkovitch 2000, Richards et al. 2000, Vences et al. 2000b):

1. Mantellinae Laurent, 1946
Type genus *Mantella* Boulenger, 1882.
Genera: *Mantella* Boulenger, 1882 and *Mantidactylus* Boulenger, 1895.
Distribution: Madagascar and Mayotte Island.

Arboreal, scansoriel, terrestrial or semi-aquatic firmisternal frogs with a bony sternal style and an intercalary element between ultimate and penultimate phalanges of fingers and toes. Almost all species with three free tarsal elements, although the third element may be very small in many species and absent in rare cases. Finger and toe pads with a complete circummarginal groove. First finger shorter or of similar length as second finger. Males without nuptial pads, and mostly with femoral glands. Derived reproductive biology (absence of strong mating amplexus, egg deposition outside of water).

2. Boophinae, new subfamily
Type genus *Boophis* Tschudi, 1838.
Genus: *Boophis* Tschudi, 1838.
Distribution: Madagascar and Mayotte Island.

Arboreal (some species partly terrestrial) firmisternal frogs with a bony sternal style and an intercalary element between ultimate and penultimate phalanges of fingers and toes. Two or three free tarsal elements. Finger and toe pads with a complete circummarginal groove. First finger shorter or of similar length as second finger. Males with nuptial pads but without femoral glands. Generalized reproductive behaviour; eggs (no foam nests) are laid into free water (not in leaf axils nor treeholes).

3. Laliostominae, new subfamily
Type genus *Laliostoma* Glaw, Vences & Böhme, 1998.
Genera: *Laliostoma* Glaw, Vences & Böhme, 1998 and *Aglyptodactylus* Boulenger, 1919.
Distribution: Madagascar.

Terrestrial firmisternal frogs with a bony sternal style and with *(Aglyptodactylus)* or without *(Laliostoma)* intercalary element between ultimate and penultimate phalanges of fingers and toes. Two free tarsal elements. Finger and toe pads without a circummarginal groove. First finger distincly longer than second finger. Males with blackish nuptial pads (when breeding) but without femoral glands. Generalized reproductive behaviour; eggs are laid into free stagnant water.

5. Discussion

The new classification proposed (Tab. 1, Fig. 1) divides the "ranids" sensu Blommers-Schlösser (1993) into a number of well-defined monophyletic taxa, and one paraphyletic taxon. The epifamily Ranoidae corresponds to the monophyletic clade of ranoid frogs morphologically defined by an ossified sternal style (secondarily reduced in a few taxa). This epifamily consists, according to our classification, of three families: the monophyletic Rhacophoridae and Mantellidae as defined here, and the paraphyletic Ranidae. The latter group will certainly be subject of further partitioning in the future; for example, the African groups defined as Cacosterninae by Blommers-Schlösser (1993) (possibly together with the genus *Tomopterna;* Vences et al. in 2000b), and the Petropedetinae, which probably merit recognition at familial level. The same is true for the enigmatic genera *Ptychadena, Hildebrandtia* and *Lanzarana* (Ptychadeninae sensu Dubois 1992).

Within the Mantellidae, three further monophyletic groups are recognized according to our classification. These groups are considered as subfamilies. The advantage of this treatment is that the well-established definition of Mantellinae as a group containing the genera *Mantella* and *Mantidactylus* (e.g. Blommers-Schlösser 1993, Glaw & Vences 1994) remains stable. The classification of the five genera *(Aglyptodactylus, Boophis, Laliostoma, Mantella, Mantidactylus)* in three subfamilies (Boophinae, Laliostominae, Mantellinae) of one family replaces their former classification in three subfamilies (Rhacophorinae, Raninae, Mantellinae) of two or three families. The proposed classification is therefore no exaggerated splitting approach. In addition, it must be kept in mind that two of the involved genera are very speciose: *Mantidactylus* currently contains about 70 nominal species in 12 subgenera, and *Boophis* contains more than 40 species in seven species groups. At least 15 new species of each genus are currently in progress of description. *Mantidactylus* is furthermore paraphyletic (Richards et al. 2000) and very diverse regarding the morphology, ecology, and reproductive biology of the species included. We expect that both genera will be partitioned at genus level when phylogenetic information becomes available to characterize sufficiently the respective lineages.

In a purely cladistic sense, the proposed classification introduces paraphyly into ranid classification (by accepting a paraphyletic Ranidae beside the Mantellidae and the Rhacophoridae). However, this situation is already implicitely accepted by recognition of the Rhacophoridae at family level, by the majority of herpetologists. Furthermore, we consider this paraphyly as a transitory stage, to be

Tab 1. Summary of the ranoid classification of Dubois (1992) and the proposed modifications according to new phylogenetic data (M monophyletic, P paraphyletic according to present state of knowledge). Subfamilies are only shown for the Malagasy family Mantellidae.

Classification according to Dubois (1992)	Proposed classification
Superfamily Ranoidea	Superfamily Ranoidea (M)
Epifamily Arthroleptoidae	Epifamily Arthroleptoidae (M?)
Family Arthroleptidae	Family Arthroleptidae (M)
Family Astylosternidae	Family Astylosternidae (M?)
Family Hyperoliidae	Family Hyperoliidae (P?)
Epifamily Dendrobatoidae	
Epifamily Hemisotoidae	Epifamily Microhyloidae (M?)
Family Hemisotidae	Family Hemisotidae (M)
Epifamily Microhyloidae	Family Microhylidae (M?)
Family Microhylidae	
Family Scaphiophrynidae	
Epifamily Ranoidae	Epifamily Ranoidae (M)
Family Mantellidae	Family Ranidae (P)
Family Phrynobatrachidae	Family Rhacophoridae (M)
Family Ranidae	Family Mantellidae (M)
[Subfamily Rhacophorinae]	Subfamily Mantellinae (M)
[Subfamily Tomopterninae]	Subfamily Boophinae (M)
[Subfamily Raninae]	Subfamily Laliostominae (M)

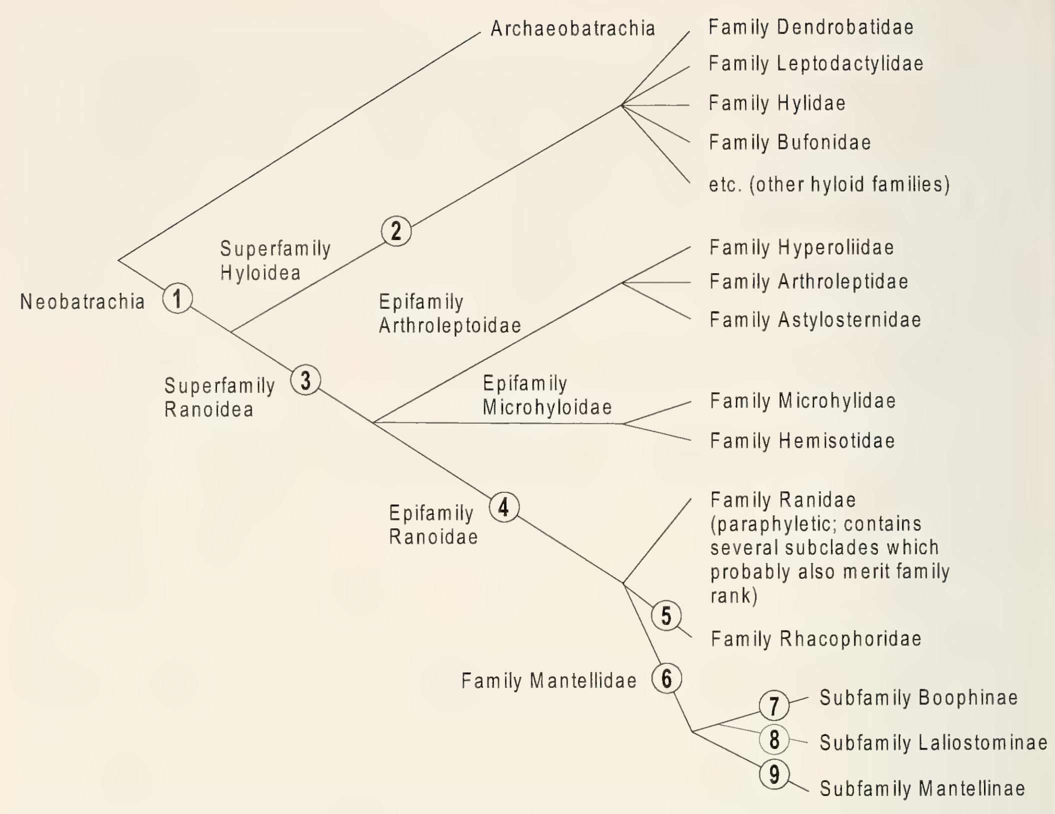


Fig. 1. Schematic phylogenetic consensus tree based on recently published molecular data, clade names according to proposed scheme. Only selected groups are included in the figure; subfamilies are only shown for the family Mantellidae. Evidence for the monophyly of numbered clades is, respectively, provided in the papers of (1) Hay et al. (1995), Feller & Hedges (1998); (2) Hay et al. (1995), Ruvinsky & Maxson (1997), Feller & Hedges (1998), Vences et al. (2000a); (3) Hay et al. (1995), Feller & Hedges (1998), Vences et al. (2000a), Emerson et al. (2000a); (4) Emerson et al. (2000a), Marmayou et al. (2000), Vences et al. (2000c), Vences et al. (submitted); (5) Richards & Moore (1998), Bossuyt & Milinkovitch (2000), Richards et al. (2000), Vences et al. (submitted); (6) Richards & Moore (1998), Bossuyt & Milinkovitch (2000), Richards et al. (2000), Vences et al. (2000b); (7) Richards & Moore (1998), Bossuyt & Milinkovitch (2000), Richards et al. (2000), Vences et al. (2000b); (8) Glaw et al. (1998b), Richards & Moore (1998), Richards et al. (2000); (9) Bossuyt & Milinkovitch (2000), Vences et al. (2000b).

maintained only until more ranid clades of unquestionable monophyly are identified and considered as distinct enough to merit familial rank.

6. Acknowledgements

We are grateful to Wolfgang Böhme (Bonn) and Alain Dubois (Paris) for fruitful discussions.

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7. Jahn, I. (Hrsg., unter Mitwirkung von E. Krause, R. Löther, H. Querner, I. Schmidt, K. Senglaub): Geschichte der Biologie, Theorien, Methoden, Institutionen, Kurzbiographien. 3. neubearbeitete und erweiterte Auflage, bearbeitet von 21 Autoren, 1998. 1088 S., 227 Abb. 238 Portraits, G. Fischer Verlag, Jena. ISBN 3-437-35010-2.

Das vorliegende Werk ist eine großartige Zusammenstellung der Geschichte der Biologie, von den Anfängen in der Vorgeschichte und im Altertum bis in die zweite Hälfte des 20. Jahrhunderts. Die einzelnen Kapitel behandeln in sich abgeschlossene Themenbereiche und können gut für sich alleine gelesen werden. So kann jeder Biologe die historischen Wurzeln seines Fachgebietes nachlesen. Der Leser wird dabei die gemeinsamen Wurzeln seines Spezialgebietes mit anderen Fachgebieten, ihre Verbindungen und gegenseitigen Befruchtungen sehen und sein eigenes Fach besser verstehen. Besonders interessant und wertvoll sind die 1650 Kurzbiographien, mit vielen Portraits und einem eigenen Literaturverzeichnis. Jede Kurzbiographie enthält Informationen zum Bildungs- und Berufsweg sowie biograpische Quellen. Ohne das Werk in seiner Gesamtheit herab setzten zu wollen, fiel dem Rezensenten auf, dass die neuere (!) Entwicklung der Systematik (phylogenetische Systematik, Cladistics etc.) nur marginal gewürdigt wurde. Hierin dürfte sich wohl die allgemein zu geringe Wertschätzung dieses Teils der Biologie widerspiegeln.

Alles in allem ein monumentales Werk, das uneingeschränkt für Biologen aller Sparten zu empfehlen ist.

K. Schönitzer

8. Weil, A., L. Brown L. & B. Neville: The wentletrap Book. Guide to the Recent Epitoniidae of the world. – Evolver, Roma, 1999. 246 pp. ISBN 88-8299-002-8.

Published by three distinct enthusiasts, this book treats a well-known and often collected family of caenogastropods (formerly mesogastropods) and fulfills the expectations of the title. It guides through the diversity and beauty of wentletrap but rests on shells solely.

The benefit of this book lies in the beautiful photographs of an overwhelming majority of epitoniid species. If specimens of a particular species were not available to the authors, the original plates and figures have been reproduced. In any case a short description of each species is provided. The arrangement of species follows the major marine, biogeographic regions from western Atlantic to the eastern Pacific; genera and species are arranged alphabetically within each chapter. Three appendices are added: (I) a listing of epitoniid names by author including synonyms; (II) a description (better: diagnoses) of genera and subgenera; and (III) an abbreviation list of museums. The book finishes with an extensive bibliography and index.

It is a pity that protoconch morphology, which has become so important for species identification and also reflects the mode of reproduction, has escaped the interests of the authors as did all anatomical, biological (e.g. hosts) and ecological knowledge of this fascinating family. Thus, this book is designed (and recommended) for shellers, although museum curators would also find it very useful to classify and document their collections.

G. Haszprunar

9. Dorresteijn, A. W. C. & W. Westheide (eds.): Reproductive Strategies and Developmental Patterns in Annelids. Developments in Hydrobiology 142. – Kluwer Academic Publishers, Dordrecht/Boston/London, 1999. xi + 314 pp. ISBN 0-7923-6018-4.

15 years after "Polychaete reproduction" (Fortschritte der Zoologie, G. Fischer Verlag 1984) this volume represents the proceedings of a symposium near Osnabrück in September 1997. 18 articles by 27 experts cover a selection of important annelid taxa (including the Pogonophora, but excluding Echiurida and Myzostomida) and various aspects of reproductive biology and ecology, as well as ontogeny and phylogeny.

The strength of the book lies in the comparative and interactive consideration of many taxa and phenomena and the overall phylogenetic background. Of particular use are the well-done reviews of relevant literature on the reproductive biology of various families showing the value of accurate papers some of which are more than 100 years old. However, it is a pity that the whole field of developmental genetics, nowadays called the "evo-devo-story", is entirely missing, even Henry and Martindale remain solely at the phenotypic ground. The final paper by Westheide, McHugh, Purschke and Rouse reviews all current concepts of annelid stem species, phylogeny and classification. A detailed index at the very end provides help throughout the whole volume.

Despite the lack of evo-devo, which admittedly is clearly stated in the title of the volume, the book is a must for everyone who is interested in reproductive biology of annelids.

G. Haszprunar

10. Rieppel, O.: Einführung in die computergestützte Kladistik. – Verlag Dr. Friedrich Pfeil, München, 1999. ISBN 3-931516-57-1.

Dieses kleine Büchlein ist exakt das, was im Titel angekündigt ist: eine Einführung, nicht mehr, aber auch nicht weniger. "Einen kurzen", einführenden Text in die computergestützte Kladistik in deutscher Sprache zu schreiben", war das Anliegen des Autors, der sich als Paläontologe und Phylogenetiker der Wirbeltiere einen Namen gemacht hat. Das Vorhaben ist geglückt, wobei insbesondere der wissenschaftsphilosophische Hintergrund der "Pattern-Cladistics" kritisch beleuchtet wird. Besonders wichtig erscheint mir die Klarstellung, daß das "Parsimonie-Prinzip" grundsätzlich nichts mit der Geschichte der Evolution zu tun hat, sondern wissenschaftstheoretisch ein Universalprinzip jeder seriösen Untersuchungsmethode darstellt. Sehr wohltuend auch die Aussage: "Alles empirische Wissen ist und bleibt hypothetisch" (S. 21).

Ich gehe nicht mit allen Aussagen des Autors konform: so ist etwa ein hypothetischer Vorfahre als notwendigerweise paraphyletisches Konzept durch das Auffinden einer einzigen Autapomorphie durchaus falsifizierbar (S. 27, 29 versus S. 35). Obwohl der Band entsprechende Fachliteratur nicht ersetzen kann und will, ist er einfach ein "Muss" für alle phylogenetisch interessierten Systematiker – und welcher gute Systematiker wäre dies nicht –, und sei es nur, um liebgewordene eigene Standpunkte im Lichte dieser schwungvoll und griffig formulierten Einführung zu überprüfen. Ein sehr geringer Preis macht Rieppels "Einführung" auch für Studierende attraktiv. Ein nach langen Jahren der Stasis deutscher Systematik überfälliges Buch.

G. Haszprunar

11. Wägele, J.-W.: Grundlagen der Phylogenetischen Systematik. ISBN 3-9315162-73-3, Verlag Dr. Friedrich Pfeil, München, 2000. 315 pp.

Endlich: Die erste umfassende Bestandsaufnahme der neuen phylogenetischen Methoden, die erste ernsthafte Auseinandersetzung mit der "pattern cladistics" des anglo-amerikanischen Raumes in deutscher Sprache liegt vor. Die deutsche Systematik und ihre (auch zukünftigen) Vertreter erhalten wieder Anschluss an die laufende internationale Diskussion im Fach. Das allein wäre schon genug Anlass zur Gratulation an Autor und Verlag.

Es gibt wohl keinen Artikel oder gar ein Buch zu diesem noch immer heftig diskutierten Thema, das allen gefallen kann. Auch ich fand einige Stellen, wo ich "nein" sagen muß: Phylogenese ist mehr als Artspaltung, der Begriff "Stammlinienvertreter" gilt m.E. nicht für ausgestorbene Seitenzweige, Analogien sind mehr als zufällige Ähnlichkeiten. Bezweifeln möchte ich auch, daß das klassische Articulata-Konzept (Annelida & Arthropoda) *versus* die vor allem auf molekularen Daten beruhenden Ecdysozoa-Hypothese (Nemathelminthes & Arthropoda) die Überlegenheit der (klassischen) Morphologie über die molekulare Sequenzanalyse belegen kann – eher wird das Gegenteil eintreten. Insbesondere die Paläontologen dürften einige Schwierigkeiten mit den Wägeleschen Definitionen (z.B. Chronospecies, Stammart, Plesion) bekommen. Schade auch, daß kaum Beispiele aus der Botanik angeführt sind, das hätte den Leserkreis sicherlich *ad hoc* deutlich erweitert.

Trotzdem: Dieses Buch ist immens wichtig, gehört unbestritten ins Regal jedes Systematikers, egal welcher Teildisziplin. Es hat Lehrbuchcharakter: Man findet alles gut gegliedert, oftmals mit sehr kompakten Zusammenfassungen; auch die beschreibenden Appendices zu den einzelnen Methoden sind wirklich gelungen. Ein sehr guter Index, ein detailliertes Literaturverzeichnis sowie sehr hilfreiche weiterführende Webseiten runden die hohe Brauchbarkeit dieses Werkes ab. Ein Tip für den Leser: Starten Sie gleich mit dem 2. Kapitel und lesen Sie die ersten 45 Seiten über die wissenschaftstheoretischen Grundlagen bei Bedarf.

Das Buch ist von der ersten bis zur letzten Seite alles andere als leichte Kost – es will erarbeitet werden; gerade das macht aber seinen Wert aus. Zusammenfassung für alle Systematiker und jene, die es sein oder werden wollen: sofort bestellen und so bald wie möglich lesen.

G. Haszprunar



SPIXIANA

ZEITSCHRIFT FÜR ZOOLOGIE

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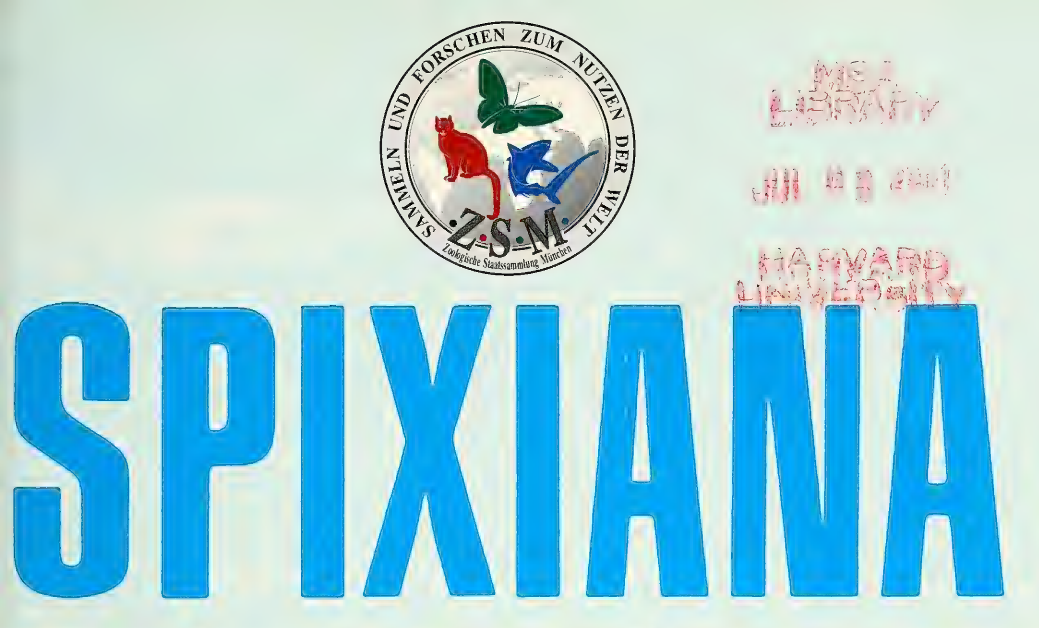
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A new species of *Loxosoma* from north-western Finistère, France

(Spiralia, Kamptozoa (= Entoprocta), Solitaria, Loxosomatidae)

Nikola-Michael Prpic

Prpic, N.-M. (2001): A new species of *Loxosoma* from north-western Finistère, France (Spiralia, Kamptozoa (= Entoprocta), Solitaria, Loxosomatidae). – Spixiana **24/2:** 97-102

A new species of solitary Kamptozoa is described from the intertidal near Saint-Pol-de-Léon, France. The species is associated with the annelid *Petaloproctus terricola* and is characterized by long, spine-like processes of the calyx. For the species the name *Loxosoma nielseni*, spec. nov. is proposed.

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Introduction

The genus *Loxosoma* Keferstein, 1862 currently contains 25 species (Nielsen 1996) of exclusively marine kamptozoans characterized by a round sucking disc at the end of the stalk and by a solitary mode of life. All species live in association with annelids, except for *Loxosoma isolata* Salvini-Plawen, 1968, which seems to be living interstitial in middle-coarse sand, and *Loxosoma jaegersteni* Nielsen, 1966 for which the adult habitat is unknown. Here, the find of a new and remarkable species of *Loxosoma* is reported.

Material and Methods

The material was collected by Claus Nielsen at Plage de Pempoul, a beach near Saint-Pol-de-Léon, France on June 17th, 2000. It comprises one host annelid specimen and about 50 kamptozoans, all belonging to the new species. Host and epizoa were narcotized with $MgCl_2$ (7.5 % in distilled water) and fixed in Bouin´s fixative. Single specimens were then transferred to microscope slides and mounted in pure Aquatex (Merck). Prior to this treatment live animals were studied in seawater.

Description of the new species

Loxosoma nielseni, spec. nov.
Figs 1-3

Types. Holotype: One specimen of almost maximum size with one bud (Figs 1D, 2A); Plage de Pempoul, Saint-Pol-de-Léon, France, holotype (on microscopical slide) deposited at Zoological Museum, University of Copenhagen, Denmark (registration number: ZMUC-ENT0024). – Paratypes: Nine specimens of different age, from same locality, also on slides and deposited in ZMUC (registration numbers: ZMUC-ENT0025a-i).

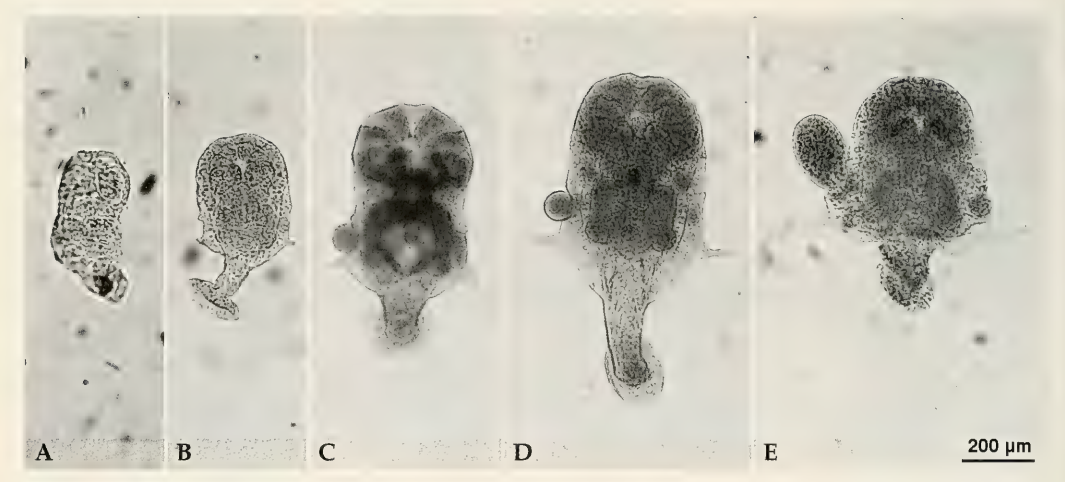


Fig. 1. Ontogenetic stages of *Loxosoma nielseni*, spec. nov. All panels are to the same scale (scale bar in E: 200 μm). The specimen in E has been deformed during preparation, causing the stalk to be pushed into the calyx. Without this deformation the specimen would have approximately the same size as the specimen in D. All specimens are paratypes, except for the one in D, which is the holotype, and all are fixed.

Etymology. The specific epithet refers to Claus Nielsen, in appreciation of his past and current contributions to our knowledge of the taxonomy, systematics and phylogeny of the Kamptozoa.

Description

The tallest specimens measure about 950 μm (300 μm stalk and 650 μm calyx), while the smallest specimens are only about 400 μm in length. All specimens possess a round sucking disc at the end of the stalk with which they adhere to the host annelid. This is the basis for their assignment to the genus *Loxosoma*. There are always eight short tentacles; even older buds, that already form an atrium, possess eight tentacle buds (Fig. 2B, arrow). The stomach is almost V-shaped, but has very conspicuous lateral pouches. On each side of the calyx there are two small structures with a refraction index much different from that of the remaining body. These possibly unicellular surface epithelial structures look like beads and are known as "gland cells", although their function is not well understood (Emschermann 1972). They have been found in many kamptozoans, so far. Their value for species characterization is deemed to be low (Emschermann 1972), but in *Loxosoma nielseni* their number, location and size (see Figs 2A, 3) is constant. The stalk has a strong musculature consisting of longitudinal and diagonal muscles, that together form a dense muscle layer which only at the stalk-calyx border dissolves into single muscle bands.

The most prominent trait of the new species are the lateral spine-like protrusions of the calyx, one on each side. The smallest individuals do not possess these protrusions and they also lack any signs of bud formation (Fig. 1A). Only in animals of about 500 μm the outgrowths can be seen, but there are still no buds (Fig. 1B). Individuals of about 700 μm show clearly visible "spines" protruding from small wing-like extensions of the calyx. Only on one side of the body, right below one of these "wings", a small and mouthless bud can be seen in most individuals of this size (Fig. 1C). In the tallest specimens bud size is increased (Figs 1D,E) and in specimens having very large buds already with an atrium and tentacle buds, the formation of a second bud on the other side, but otherwise in the identical position as the first one, can be observed (Fig. 1E). The lateral protrusions are very long in these specimens, reaching a maximum of 150 μm (Fig. 2A, inset).

The different phenotypes are here interpreted as different ontogenetic stages of the new species (Figs 1A-E). In this interpretation the series of different specimens reveals a very stereotypic way of bud formation starting when the growing animal reaches a length of 700 μm. The site of bud formation is restricted to a point below and slightly anterior to the base of the lateral processes. Also timing and sequence of the budding seem to be tightly regulated: budding occurs first only on one side of the calyx. Budding on the opposite side is initiated only when the first bud is almost ready for detachment. Also

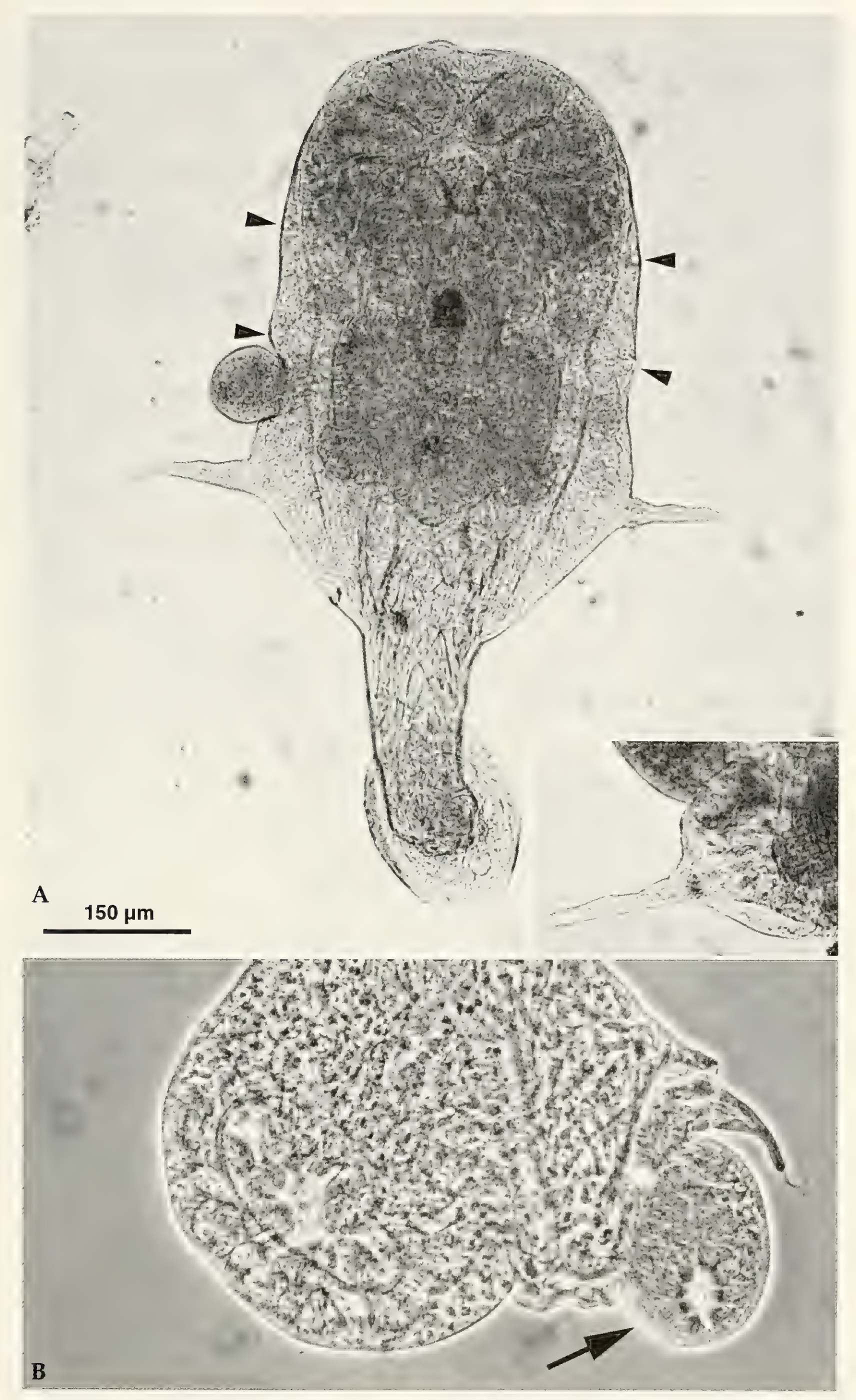


Fig. 2. Morphology of *Loxosoma nielseni*, spec. nov. **A.** Composite microphotograph of the holotype. Note the "gland cells" (arrowheads). Inset in 2A: detail of a lateral process of the specimen shown in 1E, demonstrating the maximum length of this structure. **B.** Specimen (paratype) with an older bud (arrow), already showing an atrium and a forming tentacle crown with eight tentacle buds. All panels are to the same scale (scale bar in A: 150 μm). All specimens are fixed.

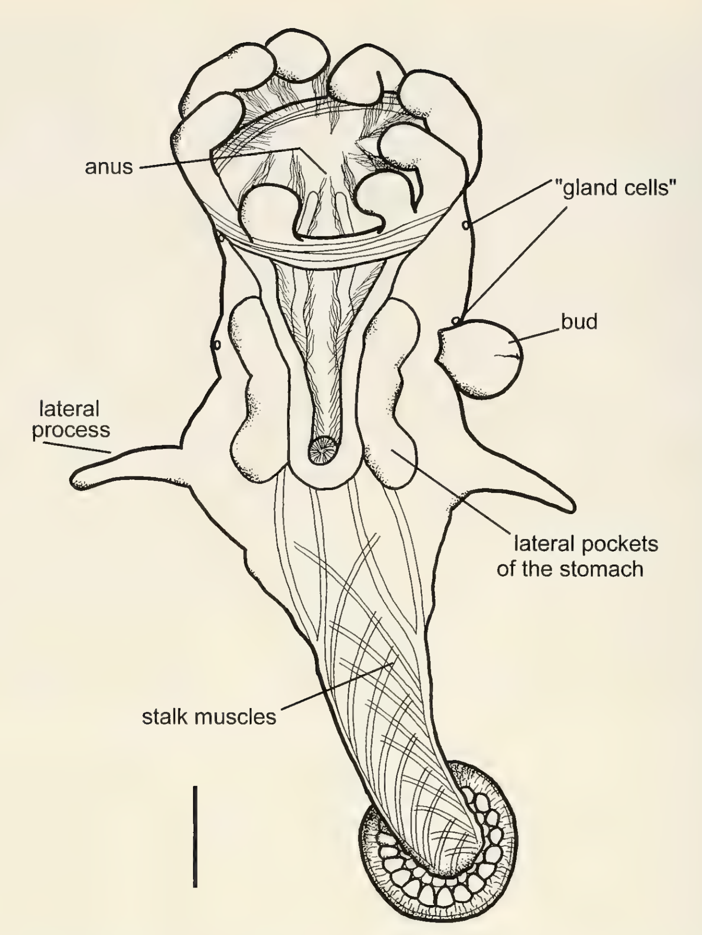


Fig. 3. Schematic representation of the anatomy of *Loxosoma nielseni*, spec. nov. The figure has been made after a living specimen. The bases of the oral tentacles are omitted. The digestive tract is shown from the rear aspect and "semi-transparent" in order to demonstrate the shape of the stomach. Of the ascending branch only the end and the anus is shown, the descending branch (mouth slit and esophagus) is omitted. The view into the U-turn can be seen as a heavily ciliated circle in the middle of the living animal. Scale bar: 100 μm.

the lateral processes show a constant growth during ontogeny. Although the growth of the body comes to a rest at approximately 950 μm, this point does not mark the end of process growth and bud formation (compare figs 1D and 1E); it seems that growth of the processes continues until the formation of the first bud is finished. The function of the processes is not known.

Habitat. *Loxosoma nielseni* has been found living on a single specimen of *Petaloproctus terricola* (det. Claus Nielsen, pers. comm.), collected in the lower intertidal. Substratum: coarse sand and shell debris.

Differential diagnosis. The combination of body size, number of tentacles and the lateral projections of the calyx readily distinguish *Loxosoma nielseni* from every other species of *Loxosoma*. Lateral processes are known from *Loxosoma loxalina* Assheton, 1912, *Loxosoma davenporti* Nickerson, 1898 and *Loxosoma saltans* Assheton, 1912. Only in the latter species these processes reach a significant length, but are still visibly shorter than in *Loxosoma nielseni*. Additionally, *Loxosoma saltans* has many more tentacles. Species similar in habitus to *Loxosoma nielseni* are: *Loxosoma claparedei* Bobin & Prenant, 1953, *Loxosoma jaegersteni* Nielsen, 1966, *Loxosoma significans* Nielsen, 1964 and *Loxosoma agile* Nielsen, 1964, all of which have more tentacles (except for *Loxosoma agile*) and lack the lateral processes. The host annelid

Petaloproctus spec. is reported only for two *Loxosoma* species (*Loxosoma annelidicola* Van Beneden & Hesse, 1864 and *Loxosoma spathula* Nielsen, 1966), both differing from the new species in lacking lateral processes and having not the correct number of tentacles. Additionally, *Loxosoma annelidicola* has a balloon-shaped calyx and almost no stalk, and therefore not in any way is resembling the new species.

Discussion

The unique trait of the new species are the extremely long processes of the calyx, the function of which remains to be investigated. Not unique, but exceptional at the least, are the stereotypical mode of budding and the strictly constant number of tentacles across all developmental stages available for study.

The scattered range of occurence of *Loxosoma* species (see map in Nielsen (1996)) suggests that most existing species of the genus remain to be discovered. The same probably is true for kamptozoans in general. This is very unfortunate, since kamptozoans play an important role in the discussion about metazoan phylogeny (Emschermann 1996, Nielsen 1977, 1995, Mackey et al. 1996, Zrzavý et al. 1998). The knowledge about plasticity of both their bauplan and life cycle, which could shed light on their affinities to other phyla and on phylogeny in general, critically depends on the discovery, description and subsequent study of all existing species. *Loxosomella brochobola* Emschermann, 1993, for example, possesses extrusive organs that resemble cnidarian nematocysts in appearance and function (Emschermann, 1993). This throws a critical light on the base of the metazoan tree, since it shows, that nematocyst-like organs can evolve convergently.

Another example for the plasticity of the kamptozoan bauplan may be *Symbion pandora* Funch & Kristensen 1995. Although this species is not entoproct, but ectoproct and thus shows some similarities to Bryozoa (Funch & Kristensen 1995), and although molecular studies seem to advocate affinities to Rotifera (Winnepenninckx et al. 1998), *Symbion pandora* in fact may be a highly derived solitary kamptozoan (see data in Funch & Kristensen (1995) and Funch (1996)). It thus could demonstrate the impacts on the bauplan and life cycle of solitary Kamptozoa in case of transition from a tube-dwelling, non-moulting host (polychaete) to a free-living, moulting one (crustacean).

Acknowledgements

The new species was discovered during the TMR Course for Evolutionary and Developmental Biology, held from May to June 2000 at the Station Biologique, Roscoff. I thank all participants, teachers and organizers for making the course such a success; hopefully, the discovery of new species will become a trademark of the course. I especially thank Lars Wittler, who drew attention on the organism in the first place and did all the work narcotizing and fixing the animals. And an extremely huge thank-you goes to Claus Nielsen, who provided the knowledge about entoprocts (and many more phyla) and last but not least – he collected the material!

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A new *Architectonica* from the Philippines

(Mollusca, Gastropoda, Architectonicidae)

Axel Alf & Kurt Kreipl

Alf, A. & K. Kreipl (2001): A new *Architectonica* from the Philippines (Mollusca, Gastropoda, Architectonicidae). – Spixiana **24/2:** 103-106

A species of the genus *Architectonica* Röding, 1798 from the southern Philippines is described as new. *Architectonia proestleri,* spec. nov. is relatively small for the genus and lives in deep water. The species is characterized by the presence of a central midrib on the body whorl and a multi-ribbed base.

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Introduction

In summer 2000 local people started dredging at Aliguay Island, Mindanao, Phlippines. During these dredgings a species of *Architectonica* was brought up which is similar to *Architectonica consobrina* Bieler, 1993, but differs in some characteristic features. Therefore it is described here as new.

Architectonica proestleri, spec. nov.
Figs 1-3

Description (in this description the abbreviations for the sculptural elements used by Bieler (1993) are taken for better comparison, see also figure No. 1).

Shell thin, light of weight. Diameter of Protoconch 1.18-1.23 mm. Teleoconch of medium to small size, diameter 12-26 mm (5.0-6.25 whorls). Moderately depressed cone shaped with whorls equally inflated on upper side and base. Umbilicus moderately wide (about 30 % of shell diameter).

Sculpture of upper side. Subsutural rib (SSR) strong and distinctly separated. Mid rib area divided in three spiral ribs of which the upper mid rib (UMR) and the central mid rib (CMR) usually are broader than the lower mid rib (LMR). The spaces between the SSR, the UMR, the CMR and the LMR are about equal and about 50 % of the broadth of the ribs. Upper peripheral rib (UPR) and lower peripheral rib (LPR) prominent but narrower; of about equal size. Grooves between LMR, UPR and LPR equal and broader than these between the mid ribs. Upper part of whorl attachment on upper part of lower peripheral rib (LPR), upper edge of IPR visible in suture. Upper side of shell and periphery crossed by deeply incised oblique axial grooves which become smooth on body whorl, segments of the mid ribs more or less corresponding. The sculpture is completely expressed after 0.5 to 1 teleoconch whorls.

Base. Infraperipheral rib (IPR) strong but narrow with one more or less fine additional spiral rib between LPR and IPR. Base with or without 1 to 3 weak spiral ribs near the umbilicus and distinct equal axial striae which faden towards the periphery. Proxumbilical rib (PUR) narrow but strong; separated from base by a wide gap. Nodose rib surrounding umbilicus (UC) large and regular. Columellar wall

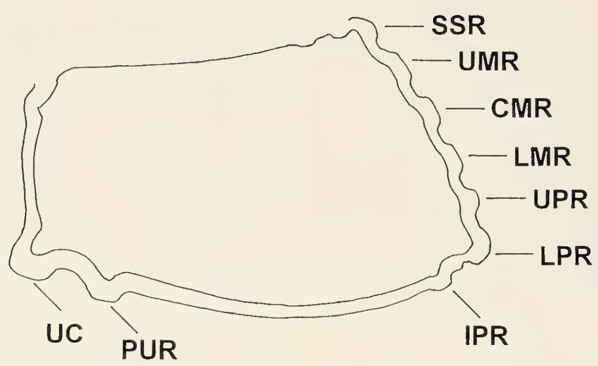


Fig. 1. Generalized cross-section through the bodywhorl of *Architectonica proestleri*, spec. nov. SSR = subsutural rib, UMR = upper midrib, CMR = central midrib, LMR = lower midrib, UPR = upper peripheral rib, LPR = lower peripheral rib, IPR = infraperipheral rib, PUR = proxumbilical rib, UC = umbilical crenae.

forming almost straight inner lip with two plications, deepest groove in UC overhanging umbilicus; no spiral sculpture on umbilical side of the wall.

Coloration. Entire shell yellowish to light beige. SSR, UMR, UPR, LPR and IPR slightly lighter (hardly visible in dead collected and light coloured shells) with irregularily brown blotches of different sizes. Base becoming lighter from the periphery towards the umbilicus, PUR and UC light with irregular brown to light brown blotches; ribs on the base also with some irregular blotches, sometimes corresponding to the blotches on PUR and UC.

Operculum and anatomy not available for study.

Types. Holotype: Diameter: 20.7 mm, diameter of protoconch 1.2 mm; height 10.3 mm; 5.5 teleoconch whorls; probably life found (Field Museum of Natural History, Chicago, IL 60605, U.S.A. no. FMNH 297361).

Paratypes:

No.	Diameter [mm]	Height [mm]	Diameter of Protoconch [mm]	Number of Teleoconch whorls	Remarks	Collection
1	26.6	13.5	1.20	6.25	life taken	A. Alf, Weidenbach, Germany, lot no. 227034a
2	18.8	9.9	1.18	5.25	life taken	A. Alf, lot no. 227034a
3	17.6	8.8	1.18	5.0	Probably life taken	A. Alf, lot no. 227034a
4	17.6	8.8	1.18	5.0	life taken	K. Kreipl, Meeresmuseum Öhringen, Germany
5	16.5	7.6	1.23	4.75	dead taken	Senckenbergmuseum Frankfurt, Germany no. SMF 321180

Type locality. All types were found at Aliquay Island near Dipolog, Western Mindanao, Philippines. The shells were dredged in a depth of 120-200 fathoms by local people.

Etymology. The species was named after Mr. W. Proestler, Puerto Galera, Mindoro, Philippines who brought it to our attention.

Discussion

The only similar species to *Architectonica proestleri* is *Architectonica consobrina* Bieler, 1993 from which it differs by its smaller size, the larger diameter of the protoconch (*A. consobrina* = 1 mm, *A. proestleri* = 1.2 mm), the presence of 3 midribs and only weak ribs on the base fading towards the periphery. *Architectonica proerstleri* has a few irregular brown blotches on UC, PUR and on the ribs of the base. The brown blotches on the SSR, UMR, UPR and LPR are quite irregular and of different size. The coloration of *A. proestleri* is paler than that of *A. consobrina* while the blotches are darker.

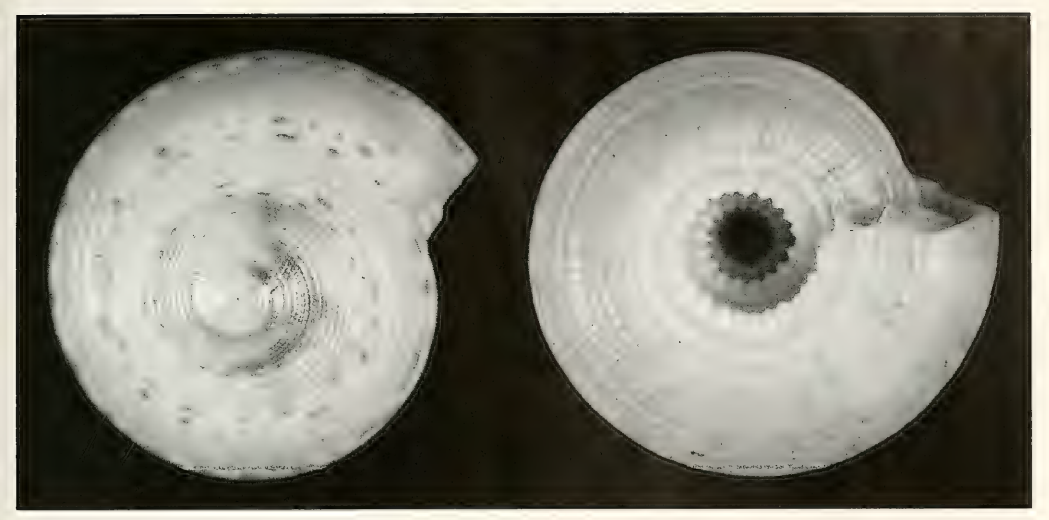


Fig. 2. Holotype of *Architectonica proestleri*, spec. nov.

Fig. 3. Paratypes of *Architectonica proestleri*, spec. nov. Paratype 1 (left), Paratype 2 (middle), Paratype 4 (right).

The only other *Architectonica* with a multi-ribbed base is *Architectonica nobilis* Röding, 1798 from the eastern Pacific, as well as subtropical and tropical eastern and western Atlantik, but this differs clearly from *Architectonica consobrina* (see Bieler 1993) and also cannot be confused with *Architectonica proestleri* because of its much larger and heavier shell, the presence of 2 mid ribs and the absence of blotches on UC.

Adelphotectonica kuroharai (Kuroda & Habe, 1961) and *A. nomotoi* (Kosuge, 1979) also show a midrib area which is divided into up to 3 to 4 spiral ribs, but both do not have a PUR.

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A new species of Turbinidae Rafinesque, 1815 from the northern Red Sea

(Mollusca, Gastropoda)

Kurt Kreipl & Axel Alf

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A new species of the genus *Turbo* Linnaeus, 1758 from the northern Red Sea is described. The shell of *Turbo marisrubri*, spec. nov. is completely different from those of the three other species of *Turbo* known to occur in the Red Sea: *Turbo petholatus* Linnaeus, 1758, *Turbo radiatus* Gmelin, 1791 and *Turbo (Lunella) coronatus* Gmelin, 1791.

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Introduction

The new *Turbo* species was offered to the senior author by two shell dealers as *Turbo pustulatus* Brocchi, 1821, respectively as *Homalopoma gestroi* (Caramagna, 1888). In fact, *Turbo pustulatus* is not a *Turbo*, but a *Homalopoma* which is a genus of the Turbinid subfamily Colloniinae Cossmann, 1916. Therefore the correct name for this species is *Homalopoma pustulata* (Brocchi, 1821). *Homalopoma gestroi* – originally described as *Collonia gestroi* Caramagna, 1888 – is a synonym.

After a close examination of the literature on Red Sea molluscs we found out that our Red Sea Turbo obviously represents an undescribed species.

Turbo marisrubri, spec. nov.

Fig. 1

Types. Holotype: Northern Sinai, Gulf of Aqaba, Egypt, Red Sea; dived in about 30 m (Senckenberg-Museum, Frankfurt am Main, Germany, no. SMF 321179.) – Paratypes: 6, from same locality.

Description of holotype

Size. Height: 24.1 mm, width: 21.4 mm.

Shell medium-sized, thick and solid; slightly taller than wide (h/w = 1.1).

Apex pinkish-white; teleoconch consisting of 5 whorls, sculptured by very distinct spiral cords. Early whorls with keeled shoulder bearing minute spines. Body whorl with three strong spiral cords at midbody with one much weaker cord between them. Subsutural ramp sculptured with four strong spiral cords of distinct, rounded nodules. Base with seven spiral cords getting weaker towards the umbilical area. Suture distinct. Columella smooth and evenly curved, heavily calloused; aperture round; umbilicus completely closed.

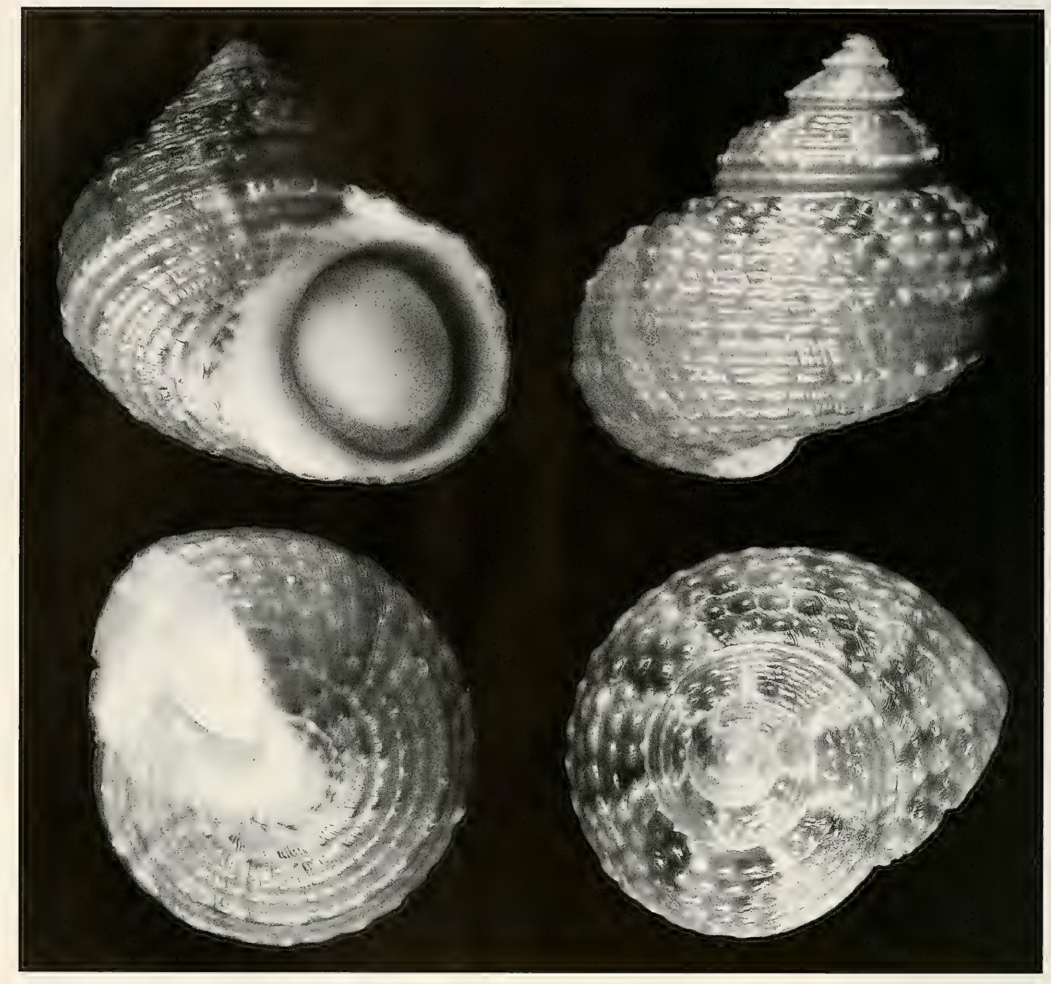


Fig. 1. Holotype of *Turbo marisrubri*, spec. nov.

Basic colour deep reddish-brown, with indistinct, rather regularly spaced axial flames of light and dark brown, particularly on the subsutural ramp. Some of the spiral cords on the base show very small, alternating light and dark spots. Columella and aperture white, aperture nacreous within; umbilical area with a small yellowish-orange blotch.

Operculum thick, round, very finely granulate, with a distinct rim along its outer margin, dull white.

Soft parts not available for study.

Variation. The paratypes 1-6 do not vary much, neither concerning the shape and sculpture nor the coloration. Paratype 2 is a bit more slender than the holotype specimen and in paratype 3 the nodules on the subsutural ramp are not as distinct as in the holotype. All paratypes were collected at the type locality.

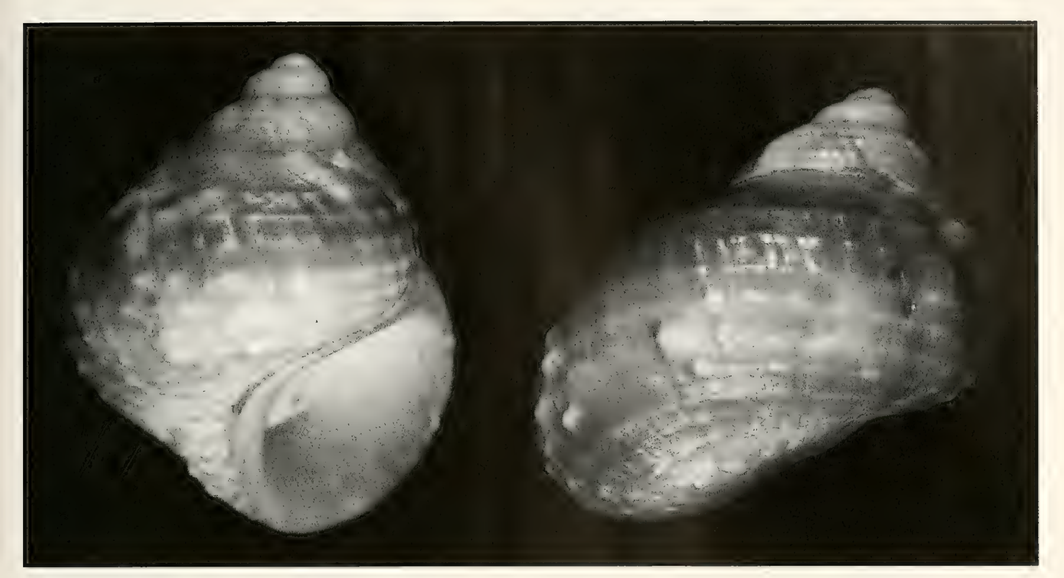


Fig. 2. *Homalopoma pustulata* (Brocchi, 1821).

Paratypes:

Paratype no.	remarks	height [mm]	width [mm]	collection
1	with operculum	24.7	20.2	Kurt Kreipl, Meeresmuseum Öhringen, no 7183a
2	with operculum	24.4	18.9	Kurt Kreipl, Meeresmuseum Öhringen, no 7183b
3	with operculum	20.6	16.9	Kurt Kreipl, Meeresmuseum Öhringen, no 7183c
4		16.9	14.2	Kurt Kreipl, Meeresmuseum Öhringen, no 7183d
5	with operculum	23.9	19.5	Axel Alf, Weidenbach, lot no 112115a
6	with operculum	23.1	18.4	Axel Alf, Weidenbach, lot no 112115a

Etymology. Combination of *mare* (lat.: sea) and *ruber* (lat.: red). Genitive: *maris rubri* = of the Red Sea.

Discussion

Turbo marisrubri, spec. nov. cannot be confused with any other Red Sea *Turbo. Turbo petholatus* Linnaeus, 1758 reaches a larger size, is completely smooth and its operculum is smooth and coloured. *Turbo radiatus* Gmelin, 1791 is much larger, bears distinct scaly protrusions and spines and has a pale greenish-blue, grey or pinkish-brown operculum. *Turbo (Lunella) coronatus* Gmelin, 1791 is distinctly wider than tall (h/w = 0.8-1.0; in T. *marisrubri* h/w = 1.1-1.3), low to flat-spired, with 2 spiral rows of pointed nodes on either side of the periphery.

The only *Turbo* species which superficially resembles *Turbo marisrubri* is *Turbo cailletii* Fischer & Bernardi, 1856 from the Caribbean but can be easily distinguished by its open umbilicus and the less numerous spiral cords on the body whorl (about 12 in *cailletii;* about 16 in *marisrubri)* which are smooth in *T. cailletii* and nodulose in T. *marisrubri.*

The only other Turbinid species from the Red Sea which shows a certain similarity to T. *marisrubri* is *Homalopoma pustulata* (Brocchi, 1821). This species can be distinguished from *T. marisrubri* by its lighter colour (basic colour: white to dirty green) and especially by the row of red blotches on the outer margin of the aperture. These red blotches often lead into fine red spiral lines visible on the body whorl near the aperture. *Homalopoma pustulata* is not a very typical Homalopoma, but on closer examination shows all features of this genus.

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We want to thank Mr. Luigi Bozzetti from Milan, Italy, for useful information on *Homalopoma pustulata* (Brocchi, 1821) and Mr. Domenico Strazzeri, Heidelberg, Germany, for helping us with the translation of Italian texts. All photographs by Uschi Damaschke, Möckmühl, Germany.

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Designation of a type species for the genus *Prosekia*, gen. nov. from South America

(Crustacea, Isopoda, Oniscidea)

Andreas Leistikow

Leistikow, A. (2001): Designation of a type species for the genus *Prosekia*, gen. nov. from South America (Crustacea, Isopoda, Oniscidea). – Spixiana **24/2:** 111-121

The neotropical genus *Prosekia* Vandel, 1968 originally comprised two species from Venezuela and a third from the Galapagos islands. Since a type species never was chosen, the genus name is not available according to § 13a ICZN. With the redescription of the Venezuelan species *Prosekia rutilans* (Vandel, 1952) and the selection as the type of the genus, the name shall be made available for the systematics of Oniscidea. Additionally, a new comprehensive definition of the genus is given and its status is discussed in the light of phylogenetic systematics and its consequences for Oniscidean systematics.

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Introduction

Several distinct species of the family Philosciidae are known from South America. The family Philosciidae is a paraphylum because of the characters used for a definition, as the slender runner-habitus (cf. Schmalfuss 1984) or many characters given in the diagnosis of Vandel (1973): cephalothorax with linea supra-antennalis, linea frontalis only in primitive species, pleon narrower than pereon, prominent neopleurae present in primitive species, three-articulate antennal flagellum, endite of maxilliped with penicil, genital papilla simple. All these characters are present in *Alloniscus* Dana, 1853 which is thought to be the most primitive representative of Oniscoidea (Schmalfuss 1989) or even in *Ligia* Fabricius, 1795 and thus are plesiomorphies of the Philosciidae. Among the Philosciidae, particularly the species described around the turn of the last century and ascribed to the genus *Philoscia* Latreille, 1804 are difficult to determine due to their poor descriptions. It was Vandel (1952, 1968, 1972) who contributed to our knowledge on the diversity of philosciid Oniscidea from South America on a higher taxonomic level. Unfortunately, several authors and even Vandel himself obscured the good beginnings by some inaccuracy. An example is the genus *Prosekia* Vandel, 1968 which was described to comprise the species *Chaetophiloscia rutilans* Vandel, 1952, *Chaetophiloscia hamigera* Vandel, 1952 and *Chaetophiloscia galapagensis* Andersson, 1960. Vandel did not designate a type species, so the genus name is unavailable according to the ICZN. He mentioned in his description only characters which are shared with other genera. Furthermore, the three species differ considerably in some characters which are important on a higher taxonomic level. These characters comprise the shape of the cephalothorax, the compound eyes, the mouth parts, the pereopods and even some details of the pleopods (pers. obs.). Until recently, the following species were included in *Prosekia* Vandel, 1968:

Prosekia rutilans (Vandel, 1952)
Prosekia hamigera (Vandel, 1952)
Prosekia galapagensis (Andersson, 1960)
Prosekia tarumae Lemos de Castro, 1984
Prosekia silvatica Lemos de Castro & Souza, 1985
Prosekia lejeunei Lemos de Castro & Souza, 1985
Prosekia insularis Lemos de Castro & Souza, 1985
Prosekia albamaculata Lima, 1996

For phylogenetic analysis of the taxon Oniscidea it is necessary to define monophyletic subtaxa. The reexamination of the members of *Prosekia* revealed the paraphyly of this genus. *Prosekia rutilans* was the first species described in the section on philosciids from Venezuela by Vandel (1952: 124), so this species is chosen as the type of the genus *Prosekia*. All the species but *Prosekia insularis*, which belongs to the genus *Littorophiloscia*, recently have been displaced to the genus *Androdeloscia* Leistikow (Leistikow 1999). *P. rutilans* from Venezuela and the genus *Prosekia* gen. nov. are redefined herein.

Genus *Prosekia*, gen. nov.

Diagnosis. Cephalothorax with linea supra-antennalis and lamina frontalis, faint linea frontalis, compound eyes with about 22 ommatidia in four rows. Antennula and antennal flagellum three-articulate. Molar penicil of mandibles composed of 5 to 6 branches, maxillula with lateral endite apically bearing 4+6 teeth, 5 of inner set cleft, medial endite with two stout penicils and inconspicuous tip, maxilla lacking setation, medial lobe half the breadth of lateral lobe, endite of maxilliped without setation and knob-like penicil, basipodite with sulcus lateralis.

Pereopods long and slender, carpus 1 with transverse antenna-grooming brush and ornamental sensory spine with serrate double-fringe on apex, sensory spines of considerable length, tricorn-like setae of basis flagelliform, coxal plates with noduli laterales, on coxal plate IV inserted more medially, sulcus marginalis present, gland pores not discernible at 400x magnification. Dactylar seta with apex slightly plumose, no sexual dimorphism. All female and male pleopod 3 to 5 exopodites slightly ovate, with lateral margin almost straight, no respiratory areas discernible, endopodites of respective pleopods bilobate. Uropod protopodite laterally with groove, endopodite inserting proximally of exopodite.

Type species. *Chaetophiloscia rutilans* Vandel, 1952, by monotypy, designated herein.

Prosekia rutilans (Vandel, 1952)
Figs 1-6

Material. Lectotype: ♂, 7 mm; paralectotypes: ♀ 9.5 mm (ovigerous), ♀ 9 mm. Venezuela, El Junquito, leg. G. Marcuzzi, 2.VII.1950, deposited in Muséum National d'Histoire Naturelle, Paris.

Synonymy. *Chaetophiloscia rutilans* Vandel, 1952.

Description

Colour. Vandel (1952) wrote: "La teinte générale est d'un rouge carmin foncé. Les zones de linéoles sont bien visibles; on observe une série de taches plus foncées sur la ligne médiane, et une autre série de taches foncées à la limite des pleurèpimères. Les pleurépimères sont pigmentés, à l'exception d'une tache claire plus ou moins étendue suivant les segments. Le pléon est entièrement pigmenté, à l'exception d'une fine ligne médiane. Les péréiopodes sont en grande partie pigmentés; les exopodites des pléopodes sont pigmentés."

Cephalothorax. Linea supra-antennalis and lamina frontalis prominent, linea frontalis inconspicuous, slightly bent, medially interrupted, slight lateral lobes, vertex arched, compound eyes composed of 22 ommatidia in four longitudinal rows (Fig. 1, Ctf).

Pereon. Body rather convex, tegument smooth and shiny, coxal plates with sulcus marginalis and noduli laterales, inserted more distally from the lateral margin on coxal plate IV, no gland pores.

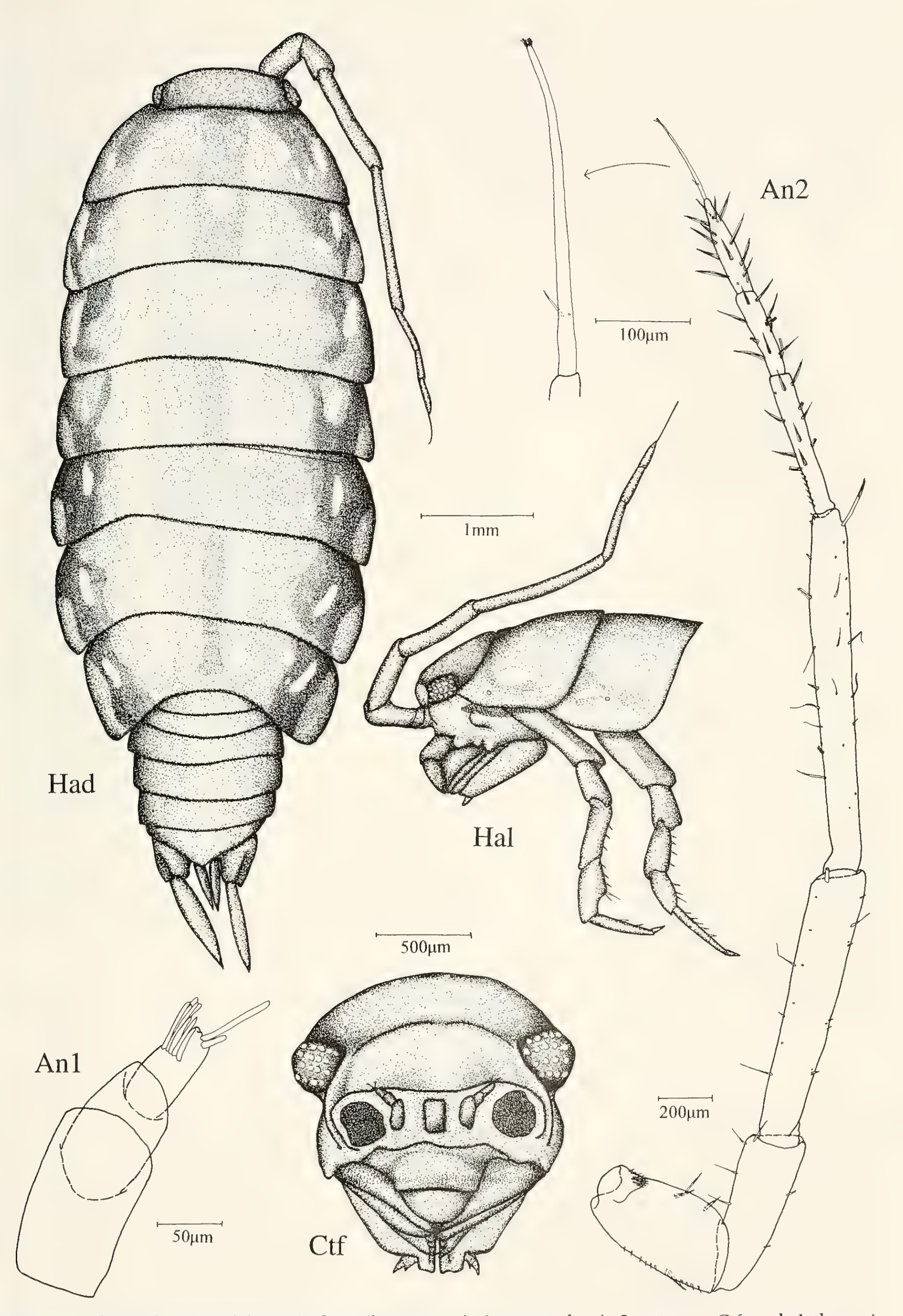


Fig. 1. *Prosekia rutilans* (Vandel, 1952). ♀ paralectotype. An1: antennula; An2: antenna; Ctf: cephalothorax in frontal view; Had: habitus in dorsal view; Hal: habitus in lateral view.

Pleon. Narrower than pereon, neopleurae of pleonites 3 to 5 very small, adpressed to pleon. Pleotelson with slightly concave lateral margins, bearing some tricorn-like setae inserting near cuticular scale.

Antennula. Composed of three articles subequal in length, distal article rather stout, bearing apical and medial set of aesthetascs, about 8 aesthetascs of medial set directed medially (Fig. 1, An1).

Antenna. Fairly slender, length ratio of peduncular articles 1:2:2:4:5, flagellum three-articulate, proximal article the longest, 1.5× longer as articles 2 and 3 each, apical bristle as long as distal article, all antennal articles bearing tricorn-like setae, aesthetascs on flagellar article 2 and 3 (Fig. 1, An2).

Mandible. Left mandible with pars intermedia densely covered with coniform setae, bearing two penicils, on right mandible coniform setae somewhat longer, standing more sparsely, only single penicil, molar penicil composed of 5 to 6 branches, additional plumose seta distally of molar penicil (Fig. 2, Mdl/r).

Maxillula. Medial endite with two stout penicils and small tip apically, lateral endite terminated by 4+6 teeth, 5 of inner set cleft, lateral fringe of trichiform setae sinuous, small additional tooth subapically on rostral surface (Fig. 2, Mx1).

Maxilla. Both lobes lacking setation, medial lobe of half the breadth of lateral, apically bearing about 10 cusps, medially some setae (Fig. 2, Mx2).

Maxilliped. Basipodite with sulcus lateralis, distal margin only slightly rounded, endite without setation, caudally with two teeth, knob-like seta and setal tuft of rostral surface lacking, palp with three setal tufts on medial border, proximal tuft composed of 3 setae, proximal article bearing two long setae (Fig. 2, Mxp).

Pereopods. Slender appendages with spinose appearance (Figs. 3, PE1-4, 4, PE5-7), particularly pereopods 5 to 7 with long sensory spines, tricorn-like setae of basis fairly slender, most sensory spines of pereopod 1 propus and carpus with apical serrate double-fringe, antenna-grooming brush of carpus 1 medially surrounded by fasciate cuticular scales, dactylus with short inner claw (Fig. 2, Dac), prominent interungual seta, dactylar seta with inconspicuous plumose apex (Fig. 2, Sd1).

Pleopods. Pleopod exopodites almost rhomboid with lateral margin straight and medial margin rounded, laterally with four to six sensory spines, exopodite 5 with transverse row of pectinate scales on caudal surface. Endopodites bilobate, bearing no setation. No respiratory areas areas on exopodites visible at 400× magnification (Fig. 5, PL1-5, 6, PL1-2).

Sexual dimorphism. In the original description, Vandel (1952) stated, that there is no sexual dimorphism in the pereopods. Since only female pereopods could be examined by means of a light microscope, Vandel's statement could not be verified in detail. At least there are no differences on the stereoscope level.

Male pleopod 1 exopodite triangular with rounded edges, apex bent laterally, endopodite rather stout, apex cylindrical, apically rounded laterally serrate, some cuticular striation on rostral surface, mediocaudal row of spiniform setae proximally terminating at same level as "lateral saw" (Fig. 5, PL1).

Male pleopod 2 exopodite pointed, with sinuous lateral margin bearing five sensory spines, endopodite straight, surpassing exopodite, apex slightly bulbous (Fig. 5, PL2).

Uropod. Compare with generic diagnosis (Fig. 4, UR).

Genital papilla: Ventral shield pyriform, but more elongate, mouths of ductus ejaculatorii parallel, surpassing ventral shield considerably (Fig. 5, Gen).

Discussion

The species which were ascribed to the genus *Prosekia* represented a rather heterogenous assembly, and at least three different taxa were united in this genus. Vandel (1968) gave a generic diagnosis including the following characters: "1. Noduli laterales longs, flagelliformes, atteignant le tiers de la longeur du tergite péréial. 2. Segment terminal de l'antennule portant deux groups distincts d'aesthetascs. 3. Endopodite du premier pléopode mâle court, portant à son extrémité des structures complexes et généralement dentées." All these characters, which should define the genus *Prosekia,* are found in several other South American genera and are therefore no autapomorphies of the genus. Long noduli laterales are typical for *Andenoniscus* Verhoeff, 1941, *Erophiloscia* Vandel, 1972 and *Xiphoniscus* Vandel, 1968, but they are comparably shorter in *P. rutilans* (pers. obs.). The short and dentate endopodites of

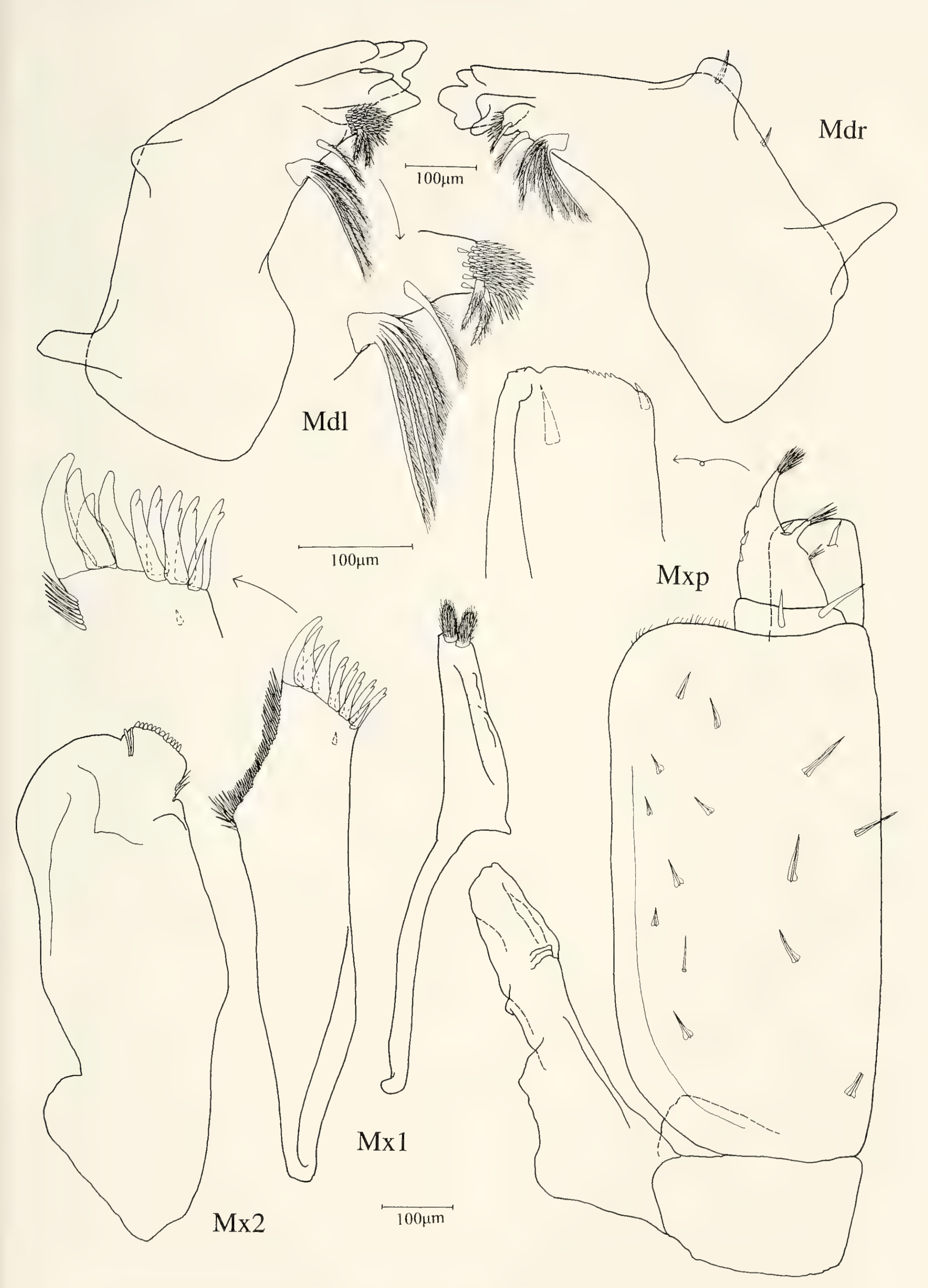


Fig. 2. *Prosekia rutilans* (Vandel, 1952). ♀ paralectotype. Mdl: left mandible; Mdr: right mandible; Mx1: maxillula with detail of apex of lateral endite; Mx2: maxilla; Mxp: maxilliped with detail of endite in rostral view.

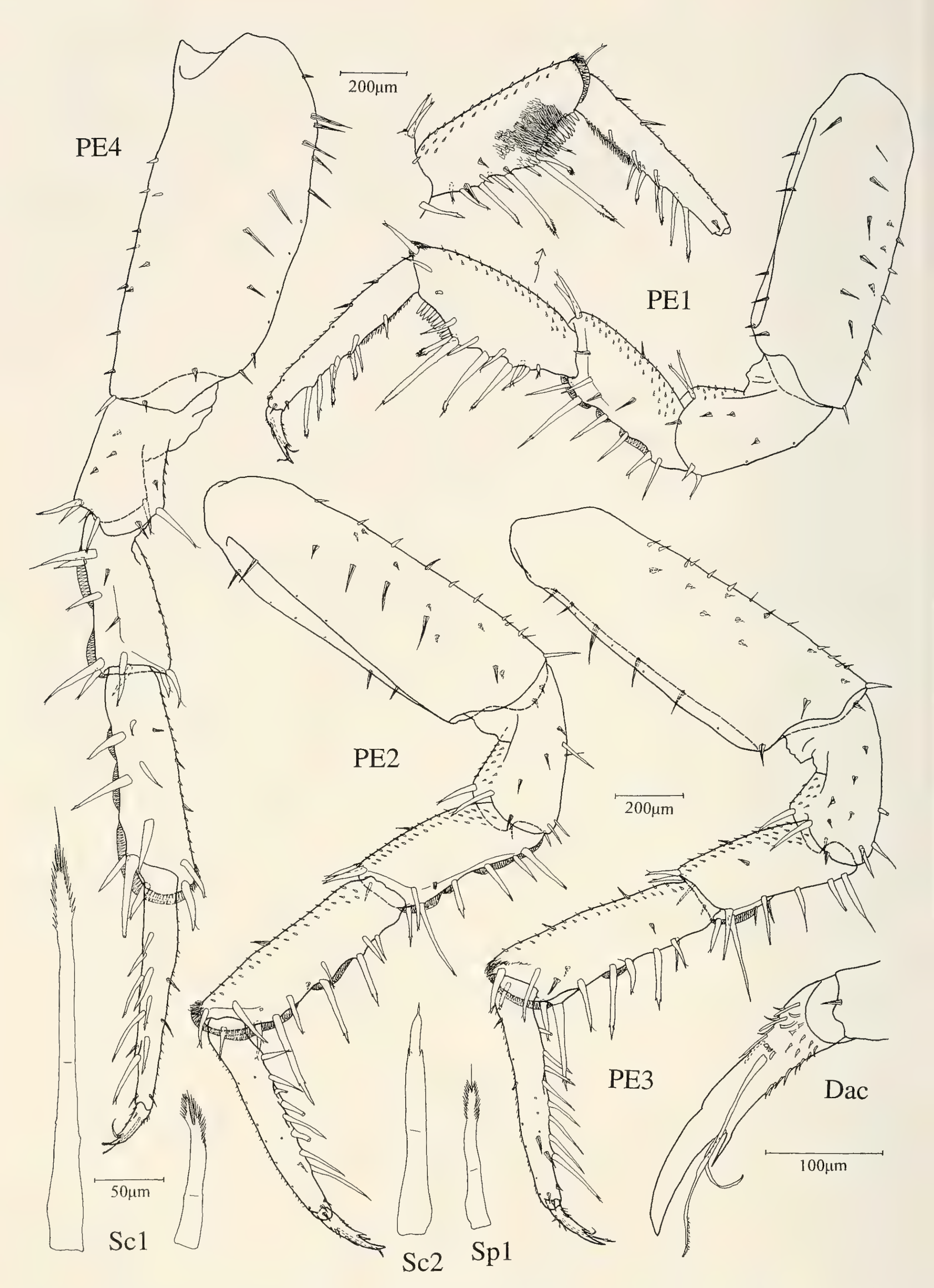


Fig. 3. *Prosekia rutilans* (Vandel, 1952). ♀ paralectotype. Dac: dactylus in rostral view; PE1-4: pereopods 1-4 caudal view, details in rostral view; Sc1: ornamental sensory spines of carpus 1; Sc2: sensory spine of carpus 2; Sp1: distal sensory spine of propus 1.

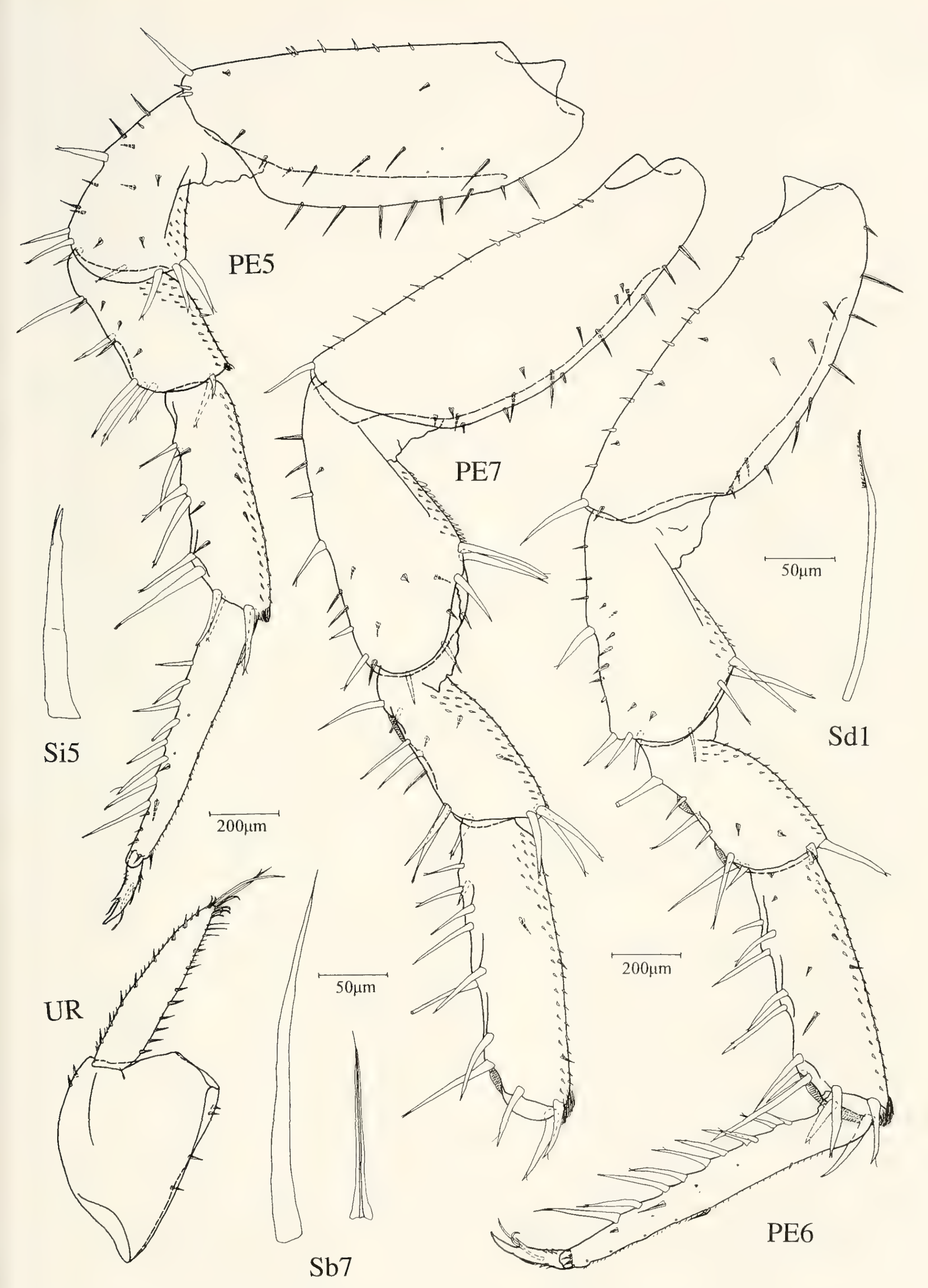


Fig. 4. *Prosekia rutilans* (Vandel, 1952). ♀ paralectotype. PE5-7: pereopods 5-7 in caudal view; Sb7: sensory spine and tricorn-like seta of basis 7; Sd1: dactylar seta 1; Si5: sensory spine of ischium 5; UR: uropod.

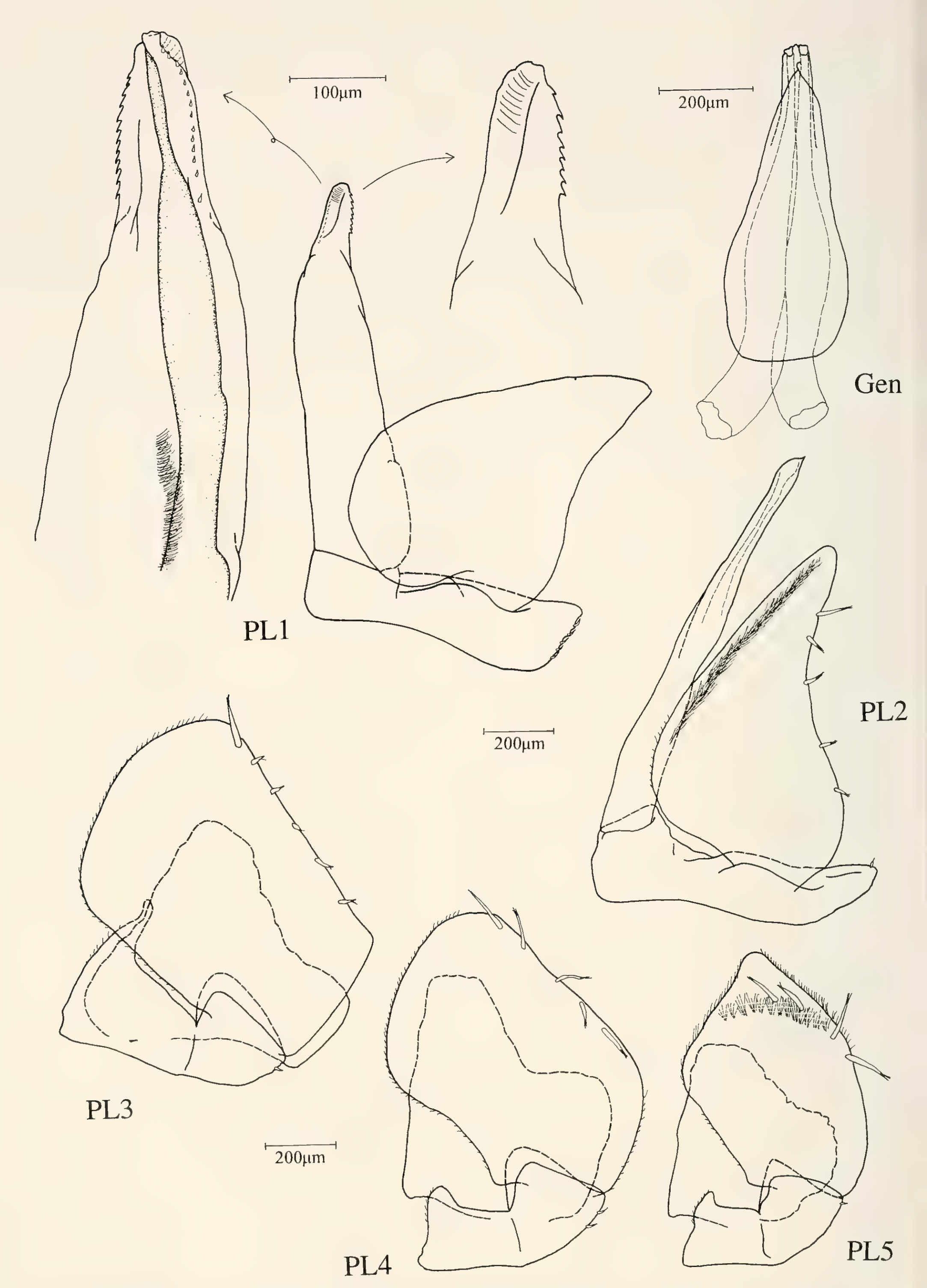


Fig. 5. *Prosekia rutilans* (Vandel, 1952). Gen: genital papilla; PL1-2: pleopods 1 and 2 (♂ lectotype); PL3-5: pleopods 3-5 (♀ paralectotype).

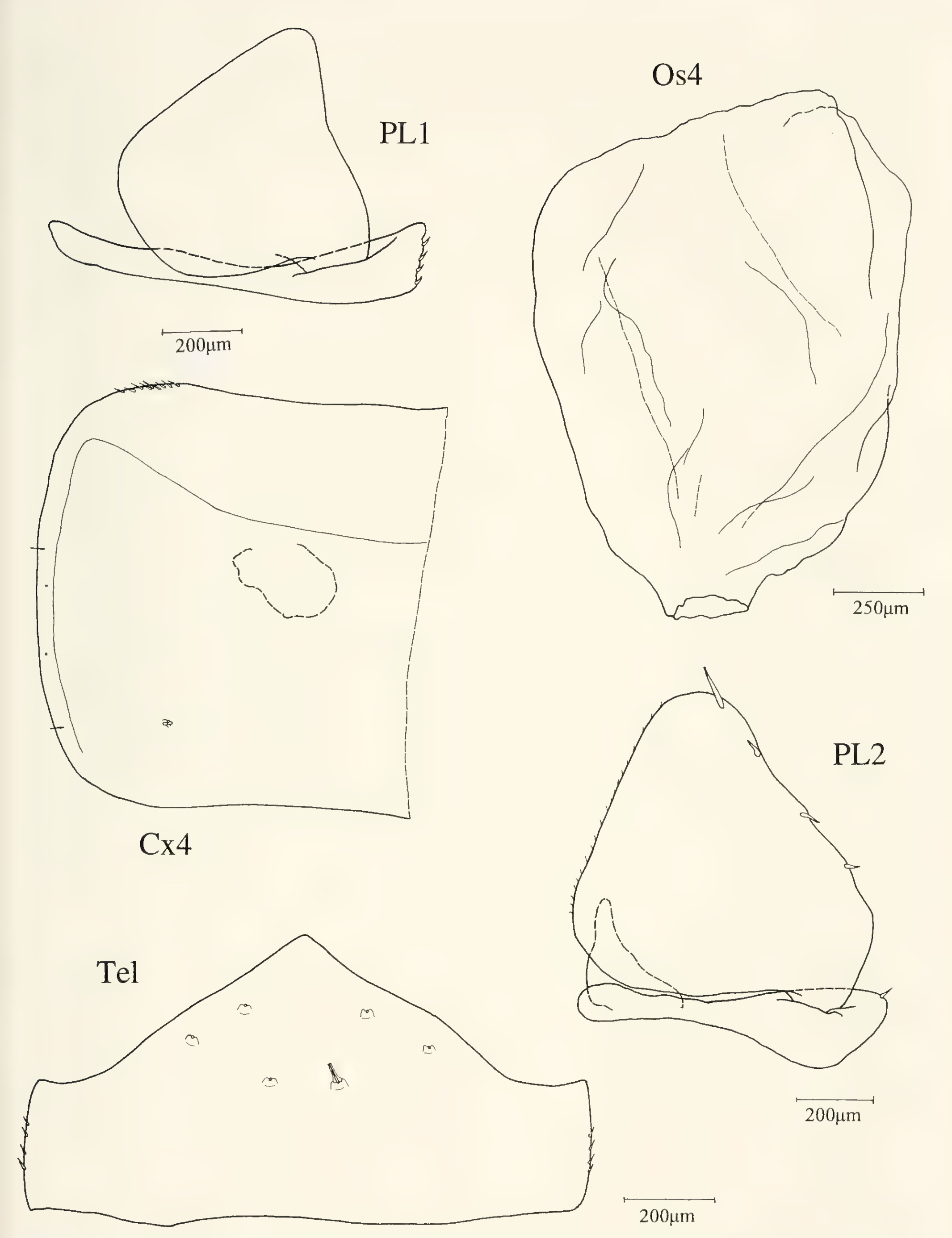


Fig. 6. *Prosekia rutilans* (Vandel, 1952). ♀ paralectotype. Cx4: coxal plate IV; PL1-2: pleopods 1 and 2; Os4: oostegite of pereonite 4; Tel: pleotelson.

the male pleopod 1 are found in *Andenoniscus* and *Xiphoniscus* (pers. obs.), and finally the shape of the antennule is similar to *Andenoniscus* (Leistikow 1998), *Erophilosica* (Leistikow 2000) and *Androdeloscia* (Leistikow 1999). The monophylum which is characterized by the shape of the antennula with an apical pair of aesthetasc and a medial tuft which sticks out is provisorically called the "*Prosekia*-group". Particularly the smaller species are fairly similar to *Andenoniscus*, they were disposited in the genus *Androdeloscia* (Leistikow 1999) due to differences in the shape of the male pleopod 5 exopodite, and the cephalothorax.

Prosekia insularis Lemos de Castro & Souza, 1986 which was described from eastern Amazonia is somewhat different. The shape of the maxilliped and the male pereopod 1 are good features for at least ascribing the species to *Littorophiloscia* Hatch, 1947 as can be seen in the re-examination of the genus by Taiti & Ferrara (1986). The shape of male pleopod 1 is quite similar to *Littorophiloscia tropicalis* Taiti & Ferrara, 1986 as can be evidenced from the drawings. Unfortunately, the type material of *P. insularis* could not be located.

Prosekia rutilans is differing from the above mentioned species of the *Prosekia*-group by several characters. The autapomorphies of *Prosekia rutilans* are:

- faint linea frontalis which is medially even more inconspicuous [linea frontalis present, not interrupted]
- profrons more level [profrons with two depressions medially of the eyes]
- knob-like penicil of maxillipedal endite reduced [knob-like penicil present]
- sensory spines of the pereopod 1 carpus apically serrate [only one prominent serrate sensory spine present, other sensory spines with two subapical tips]
- club-like apex of the male pleopod 2 endopodite, "renflé en vésicule à son extrémité" after Vandel (1952) [endopodite pointed]

Several other characters are plesiomorphies and exclude *P. rutilans* from a subtaxon of the *Prosekia*-group which comprises *Andenoniscus, Androdeloscia, Erophiloscia,* and *Xiphoniscus*: The dactylar seta is apically plumose, a character shared with the Scleropactidae, *Ischioscia* Verhoeff, 1928 and several Scyphacidae. The prominent compound eyes with ommatidia arranged in four rows are likewise found in the above mentioned taxa, whereas all the other taxa of the *Prosekia*-group have about 10 ommatidia which do not appear to be arranged in a distinct pattern. In the description of Vandel (1968) the number of ommatidia refers to the species now in *Androdeloscia*. The long *noduli laterales*, the reduction of the number of branches of the molar penicil are further apomorphic characters *Andenoniscus, Androdeloscia, Erophiloscia,* and *Xiphoniscus*. Thus, *P. rutilans* is the basalmost representative of the *Prosekia*-group.

The distant position of nodulus lateralis IV with respect to the lateral margin of the coxal plate is a character commonly found in many philosciid taxa. This character was used by Vandel (1952) to define his *groupe chaetophiloscien*. Since the polarity for this character is not resolved and many genera are insufficiently known, it is premature to discuss the monophyly of this group. Nonetheless, *Prosekia* and its allies may be related to some of the genera of this group.

Interestingly, *P. rutilans* has a characteristic feature on the male pleopod 1 endopodite: The cuticle near the apex is forming some hyaline lamellae. There are only few species with this character. Among these are several members of the *Prosekia*-group, like *Erophiloscia longistyla* Vandel, 1972. Therefore, so this character has to be ascribed at least to the ground plan of the *Prosekia*-group. No other philosciid genus from South America bears such a structure and in other taxa it probably evolved independently. For example, in Southeastern Asia this character can be found in *Exalloniscus bicoloratus* Taiti & Ferrara, 1988. But this is due to convergence, since the two genera do not have any character in common which could be evaluated as a synapomorphy of *Prosekia* and *Exalloniscus*, nor is there biogeographic evidence for a close relationship. For more details, the description of *E. bicoloratus* should be consulted (Taiti & Ferrara 1988).

With respect to the compound eyes, Vandel (1952) stated that there are about 10 to 12 ommatidia, in contradiction to this, he figured 14 (Vandel 1952: 123, Fig. 38). The reexamination revealed the presence of more than 20 ommatidia in the largest specimen, which were arranged in 4 rows.

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Anders als der bescheidene klingende Titel vermuten läßt, behandelt dieses großformatige und mit Bildern reichlich ausgestattete Buch nicht nur die eigentlichen Wildesel Afrikas, sondern auch die im deutschen Sprachgebrauch als "Halbesel" bezeichneten Equidenformen Asiens, also Onager, Dschiggetais, Kulane, Khur und Kiangs. Alle diese Formen leben in unwirtlichen und schwer zugänglichen Gebieten Afrikas und Asiens. Viele Aspekte ihres Verhaltens und ihrer Lebensweise sind daher nur unzureichend bekannt. Die Autoren dieses Buches haben im Verlauf von 15 Jahren die verschiedenen Wild- und Halbeselformen in ihren natürlichen Lebensräumen beobachten können – Somaliwildesel in der Danakilwüste, Dschiggetais in der Gobi, Kiangs in Ladakh, die Khur in Nordwestindien und Kulane in Turkmenistan. Als Ergebnis legen sie nun eine umfangreiche Monographie der Afrikanischen und Asiatischen Wildesel vor, die viel zur genaueren Kenntnis vom Sozial- und Territorialverhalten dieser faszinierenden Tiere beiträgt. Daneben setzen sich die Autoren aber auch ausführlich mit der Stammesgeschichte, der wirtschaftlichen und historischen Bedeutung der Wildesel sowie ihrer Bestandssituation und ihrem Gefährdungsgrad auseinander. Hervorzuheben ist auch die klare Darstellung der äußeren Unterscheidungsmerkmale der einzelnen Arten und Unterarten. Ein besonderer Glanzpunkt des Buches sind die zahlreichen und wirklich meisterhaften Fotografien, die von den Autoren in den Wüsten und Halbwüsten Afrikas und Asiens aufgenommen wurden. Sie zeigen beeindruckende Momente aus dem Lebenszyklus der Tiere, sei es beim Rivalenkampf, bei der Paarung oder auf ihren Wanderungen durch eine scheinbar lebensfeindliche Natur. Man kann die Bilder, die mehrfach von der BBC prämiert wurden, ohne Übertreibung als die besten und aussagekräftigsten Aufnahmen wilder Equuiden bezeichnen. Das Buch trägt wesentlich zur Kenntnis der Wild- und Halbesel bei. Darüberhinaus ist es den Autoren gelungen, etwas von der Sympathie, die sie für diese meist viel zu wenig beachtete Einhufergruppe empfinden, auf den Leser zu übertragen.

R. Kraft

13. Bergbauer, M. & B. Humberg: Was lebt im Mittelmeer? – Kosmos Naturführer, Stuttgart, 1999, 319 S., zahlreiche Farbabbildungen. ISBN 3-440-07733-0.

Der vorliegende Mittelmeer-Naturführer gehört sicherlich zu den besten seines Genres. Das für Taucher, Schnorchler und Naturinteressierte gleichermaßen empfehlenswerte Buch bietet zunächst eine Einführung in die Entstehungsgeschichte des Mittelmeeres und in die wichtigsten Großlebensräume. Im Bestimmungsteil werden, nach Großgruppen geordnet, 368 marine Pflanzen- und Tierarten (darunter 34 Algen, ca. 250 Wirbellose und 87 Fischarten) mit ansprechenden Farbfotos vorgestellt. Der Schwerpunkt der "umfassenden Zusammenstellung häufiger, bekannter und besonderer Arten" liegt verständlicherweise bei optisch auffälligen, größeren oder farbenprächtigen Arten. Unscheinbare oder versteckt lebende Arten kommen in manchen Gruppen sehr kurz: So werden z.B. Gehäuseschnecken auf nur 4 Farbtafeln (9 Arten, davon je 2 Kauris und Tritonshörner) abgehandelt, während immerhin 14 Nudibranchierarten auf 6 Farbtafeln präsentiert werden. Die Auswahl "besonderer" Arten ist nicht immer nachvollziehbar. So wird neben der heimischen Mittelmeeralge *Caulerpa prolifera* auch die jüngst aus dem Roten Meer einwandernde *Caulerpa racemosa* vorgestellt sowie letztere als gefährlicher Substratkonkurrent der heimischen Fauna und Flora in der Nähe von Industriehäfen besprochen. *Caulerpa taxifolia* hingegen wird zwar als weiterer Einwanderer erwähnt, aber weder mit Bild vorgestellt, noch werden die durch *C. taxifolia* in den letzten Jahren verursachten, dramatischen und großräumigen Veränderungen der Flora und Fauna v.a. der französischen Mittelmeerküste angesprochen. Auch sonst bleiben die Leser von unerfreulichen Abhandlungen über Ursachen und Wirkungen vielfältiger Umweltzerstörungen im Mittelmeer verschont, das azurblaue Paradies wird mit keinem Wort von Algenblüten getrübt, von Seeigeln kahlgefressen, von Eiweißfäden oder Teerklumpen verklebt bzw. allsommerlich von Menschenmassen heimgesucht, überdüngt und leergefischt.

Insgesamt aber vermittelt dieser Naturführer einen guten Überblick über die Fauna und Flora des Mittelmeeres, der Schnorchlern und Tauchern das Ansprechen vieler Arten mit Hilfe der Fotos und Beschreibungen ermöglicht. Im Gegensatz zu manch anderem Mittelmeerführer wird jeweils gesondert auf Verwechslungsmöglichkeiten und besondere Unterscheidungsmerkmale zu nicht abgebildeten Arten hingewiesen. Für die fachliche Qualität der Artbestimmungen und sonstiger Angaben garantieren namhafte Wissenschaftler, die als Berater konsultiert wurden. Für ernsthafte Bestimmungszwecke ist in vielen Gruppen jedoch das Studium spezieller Fachliteratur nicht zu ersetzen. Kurze Einführungen zur Systematik und Biologie der jeweiligen Großgruppen wären wünschenswert und übersichtlicher, als die notwendigen Informationen zur Gruppe auf die Beschreibungen der jeweiligen Arten zu verteilen. Erfreulicherweise bietet der Text zu den Fotos sehr viel Wissenswertes zu Biologie, Lebensweise und Verbreitung der vorgestellten Arten, und damit eine echte Anregung für Unterwasserfans zum Weitersuchen und -lesen.

M. Schrödl

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Three new species of litter inhabiting spiders of the genus *Scytodes* Latreille from northeastern Brazil

(Araneae, Scytodidae)

Cristina A. Rheims & Antonio D. Brescovit

Rheims, C. A. & A. D. Brescovit (2001): Three new species of litter inhabiting spiders of the genus *Scytodes* Latreille from northeastern Brazil (Araneae, Scytodidae). – Spixiana **24/2:** 123-128

Three new species of litter inhabiting *Scytodes* spiders are described. *Scytodes maresi*, spec. nov. from Mata do Pau Ferro, Areia, Paraíba; *Scytodes iabaday*, spec. nov. from Estação Biológica de Una, Ilhéus, Bahia; and *Scytodes hahahae*, spec. nov. from Parque Nacional de Monte Pascoal, Porto Seguro, Bahia, all in Brazil.

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Introduction

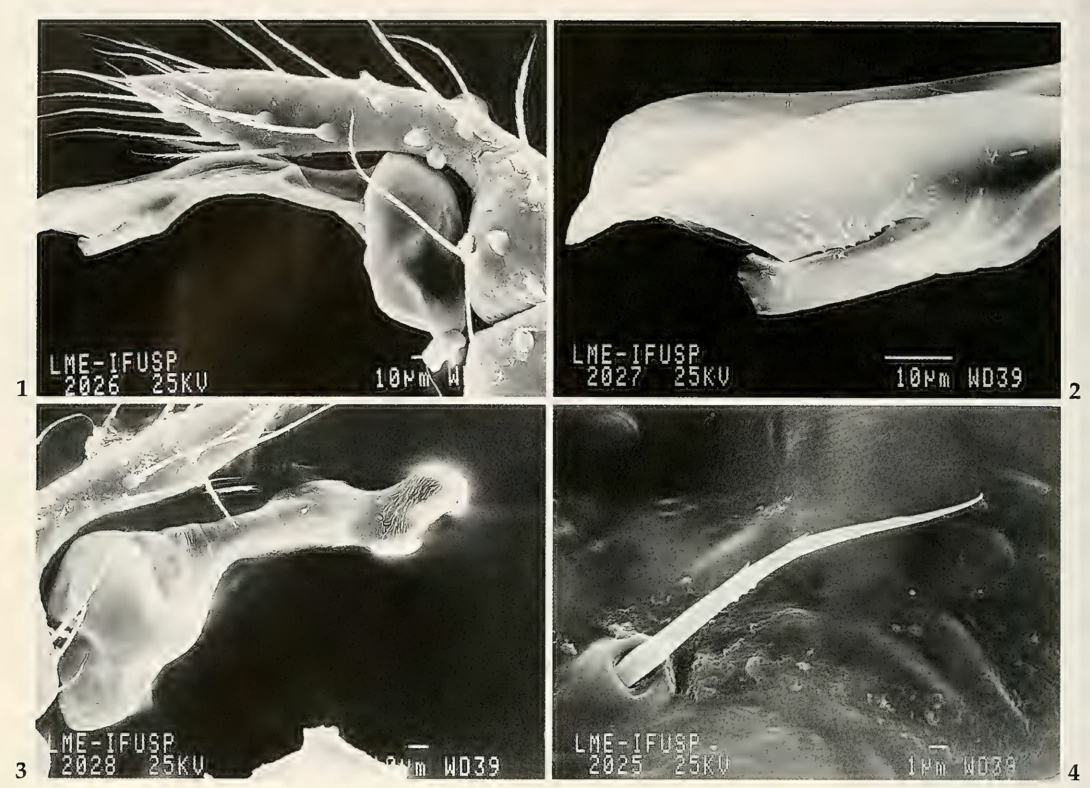
Until 1998, the Brazilian *Scytodes* comprised a group of fifteen species. Most of these were later synonymized (Brescovit & Rheims 2000) and a total of 10 new species were later described (Brescovit & Höfer 1999, Brescovit & Rheims 2000, Rheims & Brescovit 2000). As such, the Brazilian scytodid fauna today still comprises a total of fifteen valid species.

The most commonly known members of this family are large, long legged animals that inhabit holes and crevices or lie flat against the substrate (Valerio 1981). However, some scytodids are found inhabiting the ground litter layer. These spiders are very small, measuring between 1.0 and 3.0 mm. They differ from the larger, long legged species by the presence of characteristic feathery hairs covering the abdomen and carapace (Valerio 1981, Brescovit & Höfer 1999). Also, the species found in Amazonian non inundated rain forest ("Matas de Terra Firme") and some restricted areas of the Atlantic Forest seem to be endemic.

In this paper we describe three new litter inhabiting scytodid species: two from southern Bahia and one from "Brejo" Forest in Paraíba, in Brazil.

Material and Methods

The material examined belongs to the following collections: IBSP, Instituto Butantan, São Paulo (A. D. Brescovit); MCN, Museu de Ciências Naturais da Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre (E. H. Buckup); UESC, Universidade Estadual de Santa Cruz, Ilhéus, Bahia (M. de Menezes). Descriptions and terminology follow Brescovit & Höfer (1999). All measurements are in millimeters. The epigynes were submerged in lactic acid to study internal structures. Micrographs were obtained with a JEOL (JSM 840A) scanning electron microscope from the "Laboratório de Microscopia Eletrônica do Departamento de Física Geral do Instituto de Física da Universidade de São Paulo (USP)."



Figs 1-2. *Scytodes maresi*, spec. nov. **1.** Male palp, retrolateral view. **2.** Distal area.
Figs 3-4. *Scytodes iabaday*, spec. nov. **3.** Male palp, retrolateral view. **4.** Stridulatory pick.

Scytodes maresi, spec. nov.

Figs 1-2, 5-8

Types. Holotype: ♂, Mata do Pau Ferro, Areia, Paraíba, Brazil, Nov. 1999, A. D. Brescovit et al. (IBSP 25827). – Allotype: ♀, same data as holotype. – Paratypes: 1♂ (IBSP 25831); 1♀ (IBSP 25835); 1♂, 1♀ (MCN), all with the same data as holotype.

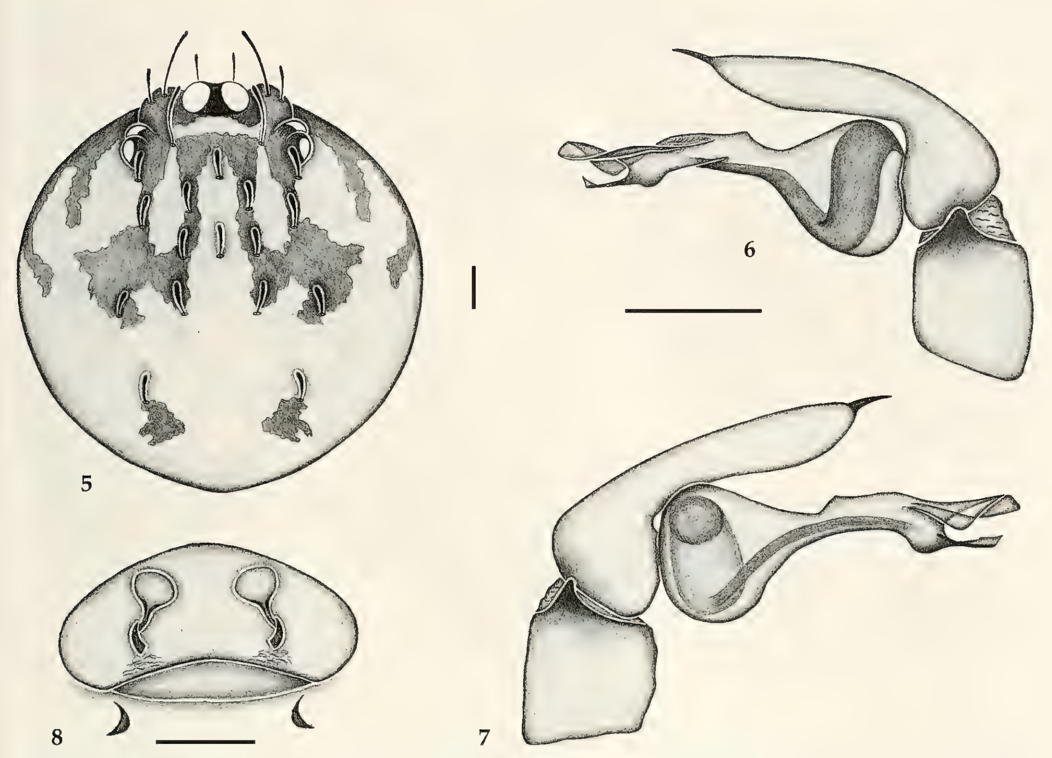
Etymology. The specific name honours the former president of the Fundação Nacional do Índio (FUNAI), Carlos Marés, who resigned after the conflicts between indians and the police, which occurred during the 500 years celebrations in Porto Seguro, Bahia, Brazil

Diagnosis. The male of *Scytodes maresi*, spec. nov. differs from the other litter inhabiting species by a ventral basal projection in the distal area of the palp (Figs 1-2) with distal triangular portion and basal rounded area (Figs 6-7). The female differs from the other species by the large size of the seminal receptacles and the very thin stalks (Fig. 8).

Description

Male (IBSP 25825). Carapace orange with brown margins and brown central pattern as shown on fig. 5. Pedipalps yellow. Labium and endites yellow. Sternum yellow with brownish margin. Legs yellow. Abdomen cream colored with brown transversal bands.

Total length 1.66. Carapace arched, 0.94 long, 0.84 wide, covered with short feathery hairs, longer on ocular area. Eye diameters: PME 0.07, ALE 0.06, PLE 0.07. Lateral eyes on tubercle. Chelicerae with subapical hyaline keel. Labium 0.07 long, 0.13 wide. Sternum 0.48 long, 0.44 wide. Legs: I – femur 0.82 / patella 0.22 / tibia 0.76 / metatarsus 0.66 / tarsus 0.36 / total 2.82 / II – 0.66 / 0.22 / 0.62 / 0.54 / 0.32 / 2.36 / III – 0.52 / 0.22 / 0.40 / 0.38 / 0.22 / 1.74 / IV – 0.64 / 0.22 / 0.54 / 0.52 / 0.24 / 2.16. Palpal femur



Figs 5-8. *Scytodes maresi*, spec. nov. **5.** Male carapace, dorsal view. **6.** Male palp, retrolateral view. **7.** Prolateral view. **8.** Female epigynum, dorsal view. Scale lines = 0.05 mm.

presenting stridulatory pick as in *S. iabaday*, spec. nov. Cymbium with long and slender distal spine. Bulb 0.18 long, medially constricted (Fig. 7). Distal area presenting dorsal groove and prolateral fold (Figs 1, 6-7). The prolateral fold with several small semicircular projections only visible under the electronic microscope (Fig. 2). Abdomen 0.72 long, 0.70 wide, rounded, covered with large feathery hairs.

Female (IBSP 25825). Coloration as in male.

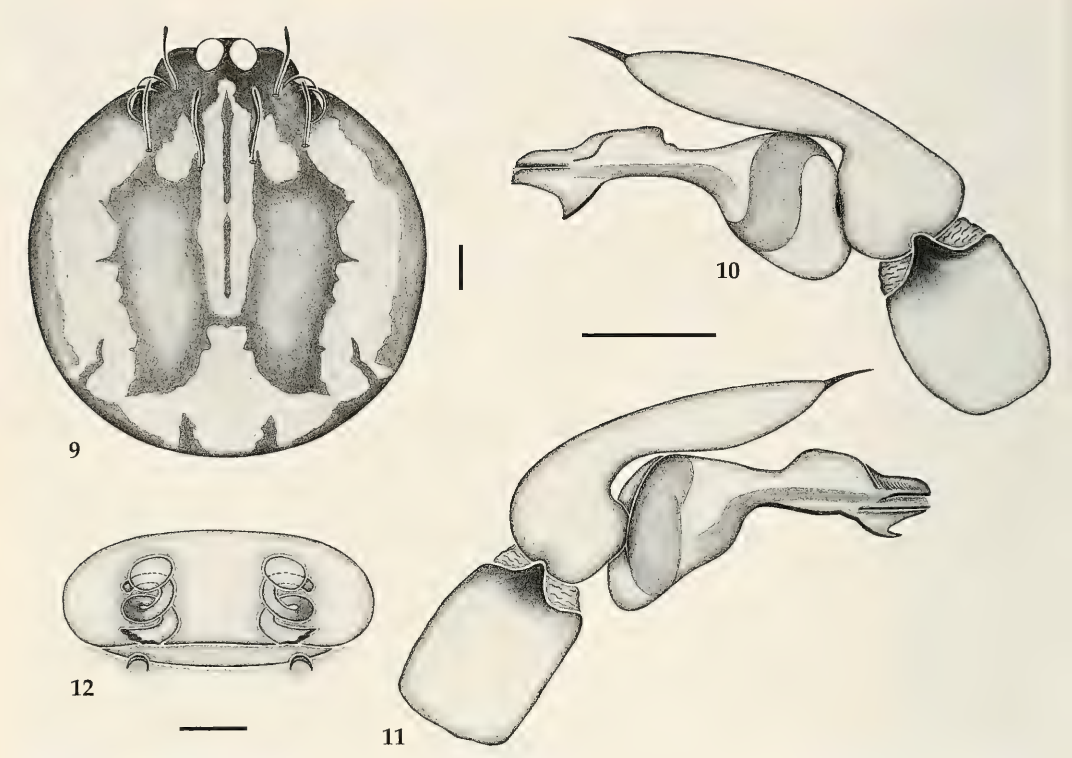
Total length 1.68. Carapace arched, 0.88 long, 0.82 wide, as in male. Eye diameters: PME 0.06, ALE 0.05, PLE 0.06. Lateral eyes on tubercle. Chelicerae as in male. Labium 0.10 long, 0.14 wide. Sternum 0.46 long, 0.44 wide. Legs: I – femur 0.78 / patella 0.22 / tibia 0.68 / metatarsus 0.54 / tarsus 0.32 / total 2.54 / II – 0.56 / 0.22 / 0.48 / 0.50 / 0.28 / 2.04 / III – 0.44 / 0.20 / 0.36 / 0.34 / 0.16 / 1.50 / IV – 0.58 / 0.20 / 0.48 / 0.46 / 0.22 / 1.94. Fovea semicircular widely separated. Internal genitalia with short narrow stalks with sclerotinized adjacent area (Fig. 8). Abdomen 0.80 long, 0.88 wide, as in male.

Variation. Ten ♂♂: total length 1.54-1.70; carapace 0.86-0.96; femur I 0.72-0.88; bulb 0.16-0.19; five ♀♀: total length 1.62-1.78; carapace 0.88-1.00; femur I 0.68-0.78.

Distribution. Known only from Paraíba, Brazil.

Natural History. The specimens were collected in pitfall traps and Winkler sampling bags. This species seems to be endemic to the region associated with the so called “Matas de Brejo”, in the state of Paraíba, Brazil. These areas are defined by Ab’Saber (1999) as humidity islands in the middle of the “sertões” (semi-arid areas). These are composed by tropical forests on high grounds, with well irrigated soils and permanent water courses (Mayo & Fevereiro 1982, Ab’Saber 1999).

Material examined. Brazil, Paraíba: Areia (Mata do Pau Ferro), 1♂, 3 juv., Sept. 1999, A. D. Brescovit et al. (IBSP 25823); 2♂♂, 2 juv., Sept. 1999, A. D. Brescovit et al. (IBSP 25824); 1♂, 1♀, 5 juv., Sept. 1999, A. D. Brescovit et al. (IBSP 25825); 1♂, 3 juv., Sept. 1999, A. D. Brescovit et al. (IBSP 25826), (06°57' S; 35°44' W), 1♀, Sept. 1999, A. D.



Figs 9-12. *Scytodes iabaday*, spec. nov. **9.** Male carapace, dorsal view. **10.** Male palp, retrolateral view. **11.** prolateral view. **12.** Female epigynum, dorsal view. Scale lines = 0.05 mm.

Brescovit et al. (IBSP 25829), 1♂, Sept. 1999, A. D. Brescovit et al. (IBSP 25830), 1♂, Sept. 1999, A. D. Brescovit et al. (IBSP 25832), 1♂, Sept. 1999, A. D. Brescovit et al. (IBSP 25833), 1♀, Sept. 1999, A. D. Brescovit et al. (IBSP 25834), 1♀, Sept. 1999, A. D. Brescovit et al. (IBSP 25836).

Scytodes iabaday, spec. nov.

Figs 3-4, 9-12

Types. Holotype: ♂, Reserva Biológica de Una, Ilhéus, Bahia, Brazil, Apr. 23, 1998, A. D. Brescovit et al. (IBSP 18009). – Allotype: ♀, same locality as holotype, Apr. 11, 1998, A. D. Brescovit et al. (IBSP 19308). – Paratypes: 1♂, Parque Nacional do Pau Brasil, Porto Seguro, Bahia, Apr. 23, 1998, A. D. Brescovit et al. (IBSP 17992); ♀, same data as holotype (IBSP 17977).

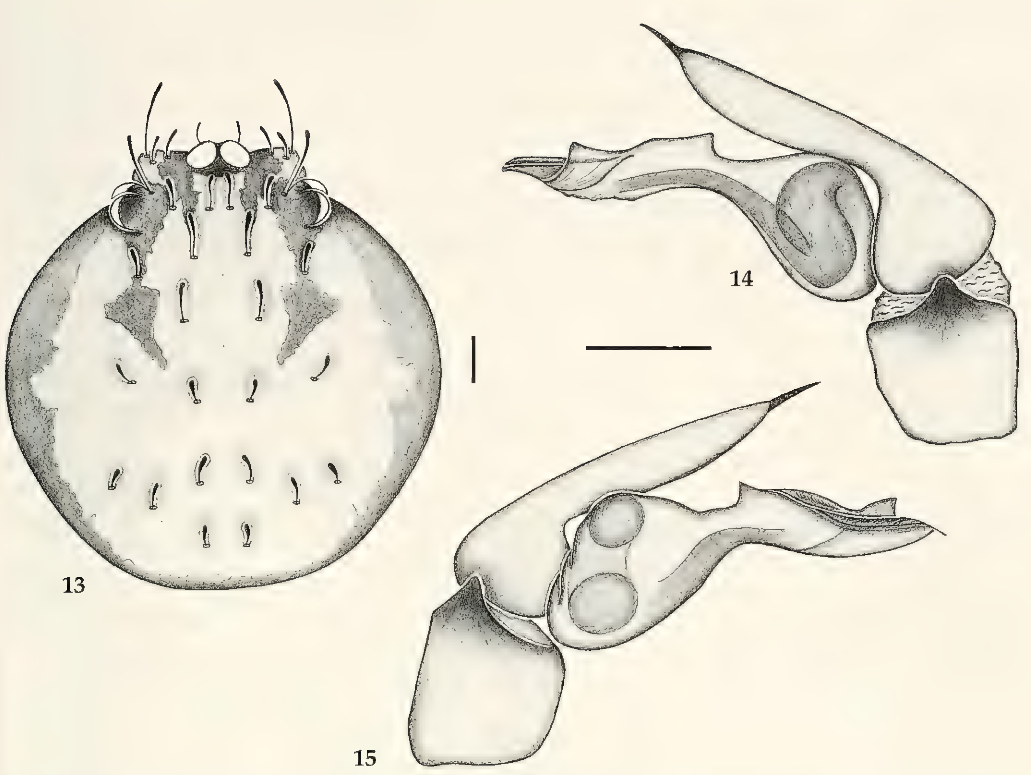
Etymology. The specific name honours Henrique Iabaday from the Suruí Tribe. The indian directly defied the President of the Brazilian Congress during the 500 Years celebrations.

Diagnosis. The male of *Scytodes iabaday*, spec. nov. differs from the other litter inhabiting species by the distal area of the male palp with ventral triangular projection and elevated squared dorsal area (Figs 10-11). The female differs by the spiraled stalk of the pair of seminal receptacles (Fig. 12).

Description

Male (IBSP 18009). Carapace light brown with dark brown pattern in center and along margin (Fig. 9). Pedipalps yellow with brownish stains at the base of femora. Labium and endites yellow. Sternum cream colored with brown stains at the base of the coxae. Legs yellow with brownish stains at the base of femora. Abdomen cream colored with brown transversal bands.

Total length 1.80. Carapace arched, 0.98 long, 0.86 wide, with long feathery hairs on ocular area (Fig. 9). Eye diameters: PME 0.06, ALE 0.07, PLE 0.07. Lateral eyes on tubercle. Chelicerae with



Figs 13-15. *Scytodes hahahae*, spec. nov. **13.** Male carapace, dorsal view. **14.** Male palp, retrolateral view. **15.** Prolateral view. Scale lines = 0.05 mm.

subapical hyaline keel. Labium 0.06 long, 0.08 wide. Sternum 0.48 long, 0.44 wide. Legs: I – femur 0.64 / patella 0.22 / tibia 0.78 / metatarsus 0.66 / tarsus 0.38 / total 2.68 / II – 0.64 / 0.18 / 0.60 / 0.52 / 0.36 / 2.30 / III – 0.50 / 0.20 / 0.40 / 0.38 / 0.24 / 1.72 / IV – 0.64 / 0.22 / 0.52 / 0.48 / 0.30 / 2.16. Palpal femur presenting stridulatory pick long and slender with rounded and projected socket (Fig. 4). Cymbium with a long and slender distal spine (Figs 10-11). Bulb 0.16 long, distal area with semicircular projections only visible under electronic microscope (Fig. 3). Abdomen 0.82 long, 0.84 wide, rounded, covered with large feathery hairs.

Female (IBSP 19308). Coloration as in male.

Total length 2.16. Carapace 0.94 long, 0.90 wide, as in male. Eye diameters: PME 0.07, ALE 0.06, PLE 0.06. Lateral eyes on tubercle. Chelicerae as in male. Labium 0.11 long, 0.12 wide. Sternum 0.41 long, 0.45 wide. Legs: I – femur 0.64 / patella 0.22 / tibia 0.60 / metatarsus 0.56 / tarsus 0.30 / total 2.32 / II – 0.60 / 0.20 / 0.54 / 0.52 / 0.30 / 2.16 / III – 0.58 / 0.24 / 0.40 / 0.40 / 0.24 / 1.86 / IV – 0.72 / 0.24 / 0.54 / 0.52 / 0.26 / 2.28. Positioning ridge transversal with fovea semicircular widely separated. Internal genitalia with a pair of oval seminal receptacles and sclerotized area adjacent to base of stalks. Abdomen 1.22 long, 0.94 wide, as in male.

Variation. Six ♂♂: total length 1.40-1.80; carapace 0.84-1.06; femur I 0.64-0.84; bulb 0.13-0.17; two ♀♀: total length 1.82-2.16; carapace 0.94-1.00; femur I 0.64-0.90.

Distribution. South of Bahia, Brazil.

Natural History. The specimens were collected in pitfall traps and by manual litter sorting.

Material examined. Brasil. Bahia: Ilhéus, 1♂, F. Dias (UESC); (Campus do CEPLAC), 1♀, Apr. 11, 1998, A. D. Brescovit et al. (IBSP 19233); (Reserva Biológica de Una), 2♂♂, F. Dias (UESC), 1♂, F. Dias (IBSP 25828), 1♂, F. Dias (IBSP 25829).

Scytodes hahahae, spec. nov.
Figs 13-15

Types. Holotype: ♂, Parque Nacional do Monte Pascoal, Porto Seguro, Bahia, Apr. 21-23, 1998, A. D. Brescovit et al. (IBSP 19460).

Etymology. The specific name honors the hã-hã-hãe pataxó tribe from southern Bahia, whose chief, Nailton Pataxó, was the leader of the movement against the 500 years celebrations.

Diagnosis. The male of *Scytodes hahahae* differs from the other litter inhabiting species by the distal area of the palp with a retrolateral pocket-like projection (Fig. 14) and a pointed projection in the basal area (Fig. 15).

Description
Male (IBSP 19460). Carapace yellow with brown pattern behind eyes and along the margin (Fig. 13). Pedipalps yellow. Labium and endites yellow with light brown margin. Sternum yellow with light brown margin. Legs yellow. Abdomen cream colored with brown transversal bands.

Total length 1.80. Carapace arched, 0.92 long, 0.84 wide, covered with short feathery hairs, longer on ocular area (Fig. 13). Eye diameters: PME 0.07, ALE 0.07, PLE 0.07. Lateral eyes on tubercle. Chelicerae with subapical hyaline keel. Labium 0.06 long, 0.09 wide. Sternum 0.46 long, 0.45 wide. Legs: I – femur 0.84 / patella 0.20 / tibia 0.80 / metatarsus 0.78 / tarsus 0.28 / total 2.90 / II – 0.72 / 0.22 / 0.66 / 0.64 / 0.30 / 2.54 / III – 0.58 / 0.22 / 0.44 / 0.44 / 0.20 / 1.88 / IV – 0.64 / 0.22 / 0.58 / 0.56 / 0.26 / 2.26. Palpal femur presenting stridulatory pick as in *S. iabaday*, spec. nov. Cymbium with a long and slender distal spine. Bulb 0.18 long, with dorsal groove with prolateral long and slender rim (Fig. 15). Abdomen 0.88 long, 0.76 wide, rounded, covered with large feathery hairs.
Female. Unknown.

Distribution. Southern Bahia, Brazil.

Natural History. The specimen was collected in manual litter sampling.

Material examined. Only the type.

Acknowledgements

We wish to thank Prof. Pedro Kiyohara and Miss Simone Perche de Toledo (USP) for the scanning electron micrographs, Hubert Höfer for helpful comments on the manuscript, Maria de F. Dias and Dr. Max Menezes for the loan of material. This work was supported by CNPq and "Fundação de Amparo à Pesquisa do Estado de São Paulo" (FAPESP No. 96/7052-9; 98/11532-1).

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Traverhyphes: a new genus of Leptohyphidae for *Leptohyphes indicator* and related species

(Insecta, Ephemeroptera)

Carlos Molineri

Molineri, C. (2001): *Traverhyphes*: a new genus of Leptohyphidae for *Leptohyphes indicator* and related species. (Insecta, Ephemeroptera). – Spixiana **24/2:** 129-140

Traverhyphes gen. nov. is established and illustrated for two neotropical species: *Traverhyphes indicator* (Needham & Murphy, 1924) new comb., and *Traverhyphes pirai,* spec. nov. The first is redescribed from imagos of both sexes, nymphs and eggs collected in Argentina. *Traverhyphes pirai* is described from male subimagos from Brazil (Rio de Janeiro). Female imagos, nymphs and eggs of *T. indicator* are described for the first time. *Traverhyphes,* gen. nov. can be distinguished from the other genera of Leptohyphidae in the male imago by its characteristic genitalia, and by the opercular gill size and form in the nymphs.

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Introduction

The family Leptohyphidae is an important component of the neotropical river fauna and is showing to be a very diverse group of mayflies, with numerous undescribed taxa. Recently, two related new genera of Leptohyphidae had been described: *Allenhyphes* Hofmann & Sartori (in Hofmann et al. 1999) and *Yaurina* Molineri (2001). In the present paper another genus is proposed: *Traverhyphes* to include *Leptohyphes indicator* Needham & Murphy (1924) and *Taverhyphes pirai,* spec. nov.

L. indicator was the sixth species described in the genus and even at that time the unusual form of the penes was remarked using this character to distinguish it from the other species of the genus (Needham & Murphy 1924: 32). Later Traver (1958) studied the holotype and some subimagos from Uruguay and redrew the genitalia noting the presence of a pair of "spear-like processes" at the base of penes that were omitted in the original description. Posteriorly Domínguez (pers. comm.) studied the holotype discovering the presence of a pair of long posterolateral projections on the styliger plate that the preceding authors did not mention.

Male imagos of the type species of the genus (*L. eximius* Eaton) were reared and show genitalia of the *peterseni*-type (Molineri, in prep) and it became clear that *L. indicator* is not congeneric with this species.

In the present paper a new genus is described for *Leptohyphes indicator* and a related new species. New specific description and drawings are given for *L. indicator,* including for the first time the female, eggs and nymphs.

Collections from other localities in South America show that *Traverhyphes* is a widespread group. Almost all the material was collected in light traps and is represented only by subimagos, one of these species (Brazil, Rio de Janeiro) is described and illustrated for its interesting male genitalia.

Terms used for thoracic description and discussion are from Kluge (1992).

Traverhyphes, gen. nov.
Figs 1-45

Type species. *Leptohyphes indicator* Needham & Murphy (1924: 33), original designation.

Species included: *T. indicator* (Needham & Murphy, 1924) comb. nov. and *T. pirai*, spec. nov.

Etymology. The genus is dedicated to Jay R. Traver whose work is the base for the present paper and other studies in Leptohyphidae, "-hyphes" for a common termination in generic names of the family.

Description

Imago. Length of male: body: 3.4-3.8 mm; fore wings: 3.3-3.9 mm; hind wings: 0.60-0.78 mm. Length of female: body: 4.0-5.0 mm; fore wings: 4.3-4.9 mm.

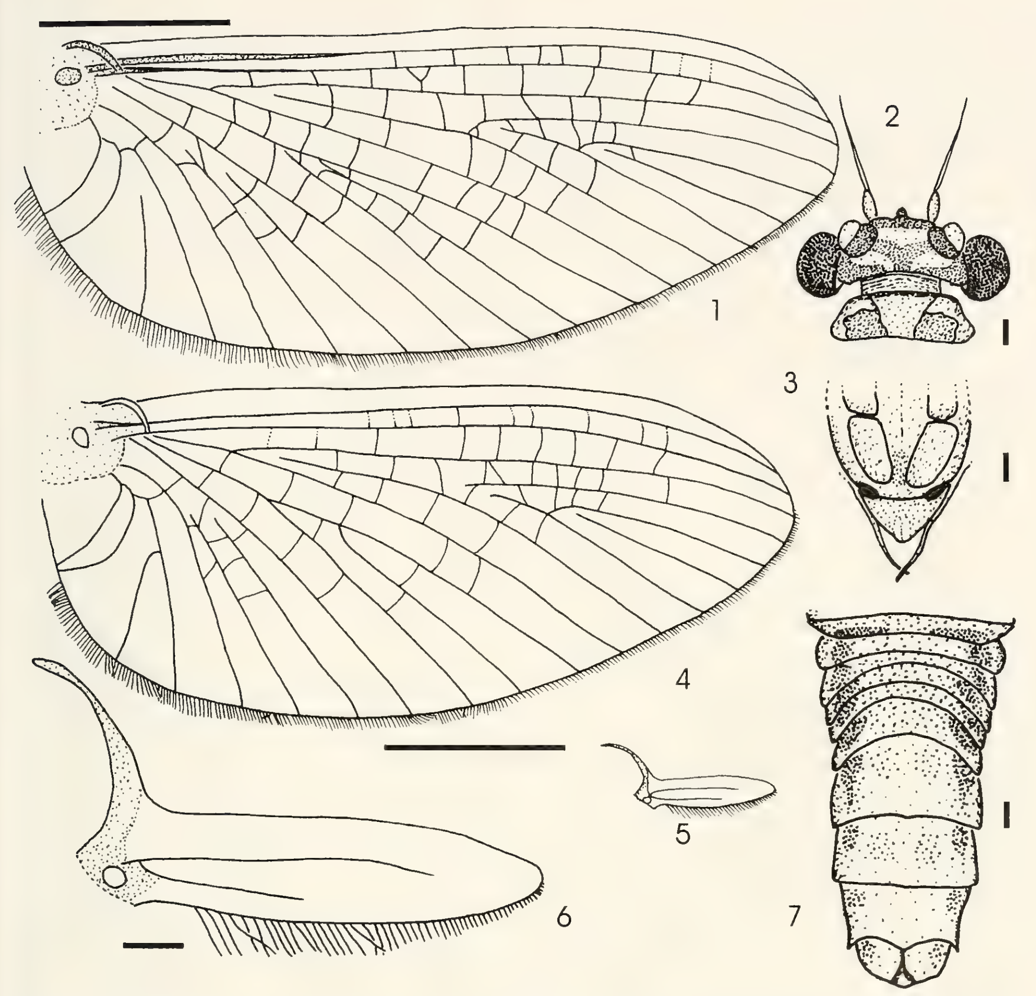
Head (Fig. 2). Eyes of male separated by a distance of 3 × diameter of an eye, eyes of female by 4 × diameter of an eye; lateral ocelli large, 0.7 × diameter of an eye; median ocellus small; occiput with a pair of small circular sclerites behind lateral ocelli. Antennae: pedicel 2.5 × length of scape, flagellum 3 × length of pedicel. Frontal part of head with a longitudinal crest from median ocellus to venter.

Thorax. Pronotum with sclerites on lateral ⅓, medially membraneous (Fig. 2). Mesonotum: fore mesonotal transverse invagination (FMI) deep and well marked; anterolateral corners of mesoscutellum darker than the rest, membranous filaments long (Fig. 3). Legs of male: fore and middle femora of similar length, hind femora 23-32 % longer than fore femora; fore tibiae and tarsi long, 2.2-2.4 × longer than middle tibiae+tarsi and 1.8-2.0 × longer than hind tibiae+tarsi. Legs of female: fore and middle femora of a similar length, hind femora 20-33 % longer than fore femora; fore and middle tibiae and tarsi of a similar length, hind tibiae and tarsi long, 1.2-1.3 × longer than fore tibiae+tarsi. Pair of tarsal claws of all legs dissimilar, one blunt paddle-like and the other apically hooked, except on fore legs of male, both blunt. Wings. Fore wings (Figs 1, 4) with fringed posterior margin, vein Icu1 attached at base with CuA and CuP by a cross vein, CuP attached at base with A, A and CuP ends very close on hind margin. Hind wings of male (Figs 5-6) reduced, total length of hind wings 0.17-0.20 length of fore wings, absent in female. Hind wings of male with fringed posterior margin and two longitudinal veins, with a long and curved costal projection 0.47-0.60 × length of wing.

Genitalia. Styliger plate with a pair of large posterolateral projections (Figs 8, 10, 11, 15, 38) dorsal to forceps; an additional pair of smaller projections arise from hind margin, between base of forceps (Figs 10, 15, 38, 40), from lateral view these projections are acute. Forceps (Figs 8, 10, 11, 15, 38) three-segmented, segment 1 short and stout, segment 2 long and slender, segment 3 globular and small. Penes (Figs 9, 13-14, 38, 40) with a deep but unconspicuous apical notch, penes flattened with a pair of membranous rounded lobes at apex, these lobes with small knobs as in fig. 41; lateral margins of penes sclerotized; base of penes with a sclerotized ring (Figs 13, 15), and with a pair of relatively short dorsal spines arising at the base of the apical lobes, apex of spines perforated and directed medially (Fig. 40). Male terminal filament 3.6 and cerci 2.7 × length of fore wings. Female terminal filament 2 and cerci 1.6 × length of fore wings.

Nymph (Fig. 37). Length of male: body, 3.5 mm; mesonotum, 1.3 mm; hind femora, 0.85 mm; tails, 3.2 mm. Length of female: body, 3.6-4.1 mm; mesonotum, 1.3-1.4 mm; hind femora, 0.95-1.00 mm; tails 4.2-4.7 mm. Head hypognathous, wider than long. Antennae 3-3.5 × length of head, flagellum with whorls of fine setae at articulations. Mouthparts: anteromedian emargination of labrum as in fig. 16, on ventral side with a pair of asymmetrical submedian rows of setae; mandibles as in figs. 21-22, left prosteca wider at base than right prosteca; molar region of left mandible with a notorious conical tooth (arrow on fig. 24); maxillae long and slender, suture between galea and lacinia almost absent (Figs 19-20), palpi small and bisegmented with apical setae; setae and spines as in figs 19-20; hypopharynx with asymmetrical setation at base of superlinguae, linguae subcuadrate (Fig. 23); labium (Fig. 18) covering almost completely venter of head, submentum 3 × wider than mentum, palpi three-segmented (Figs 17-18).

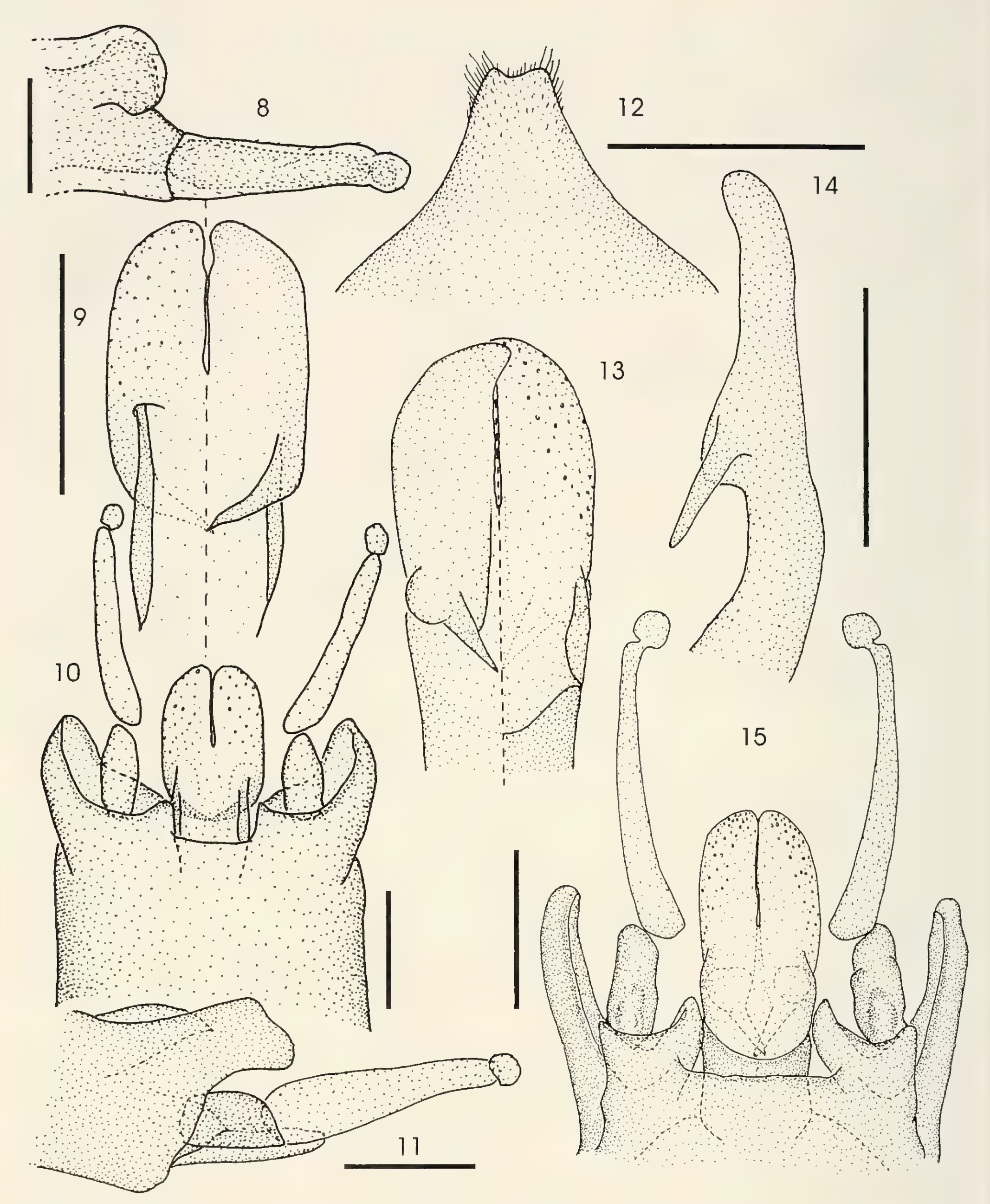
Thorax. Pronotum rectangular, slightly concave at posterolateral corners (Fig. 37). Leg proportions: maximum length/max. width of femora: fore 2.50-2.67, middle 2.73-2.83, hind 2.85-3.08; fore and middle femora with a similar length, hind femora 23-25 % longer than fore femora; middle tibiae 0.7 % longer and hind tibiae 43-50 % longer than fore tibiae; fore and hind tarsi of a similar length, middle tarsi 13-20 % shorter than fore tarsi. Legs long and slender with spines and scattered groups of fine setae as in figs 32-34; femora slightly bowed; transverse row of spines on dorsum of fore femora as in



Figs 1-7. *Traverhyphes indicator*. Imagos: **1.** Female fore wing. **2.** Head of male. **3.** Posterior half of male mesonotum. **4.** Male fore wing. **5.** Male hind wing. **6.** Detail of hindwing. **7.** Abdomen of female. Scale = 0.1 mm, except figs. 1, 4, 5 = 1 mm.

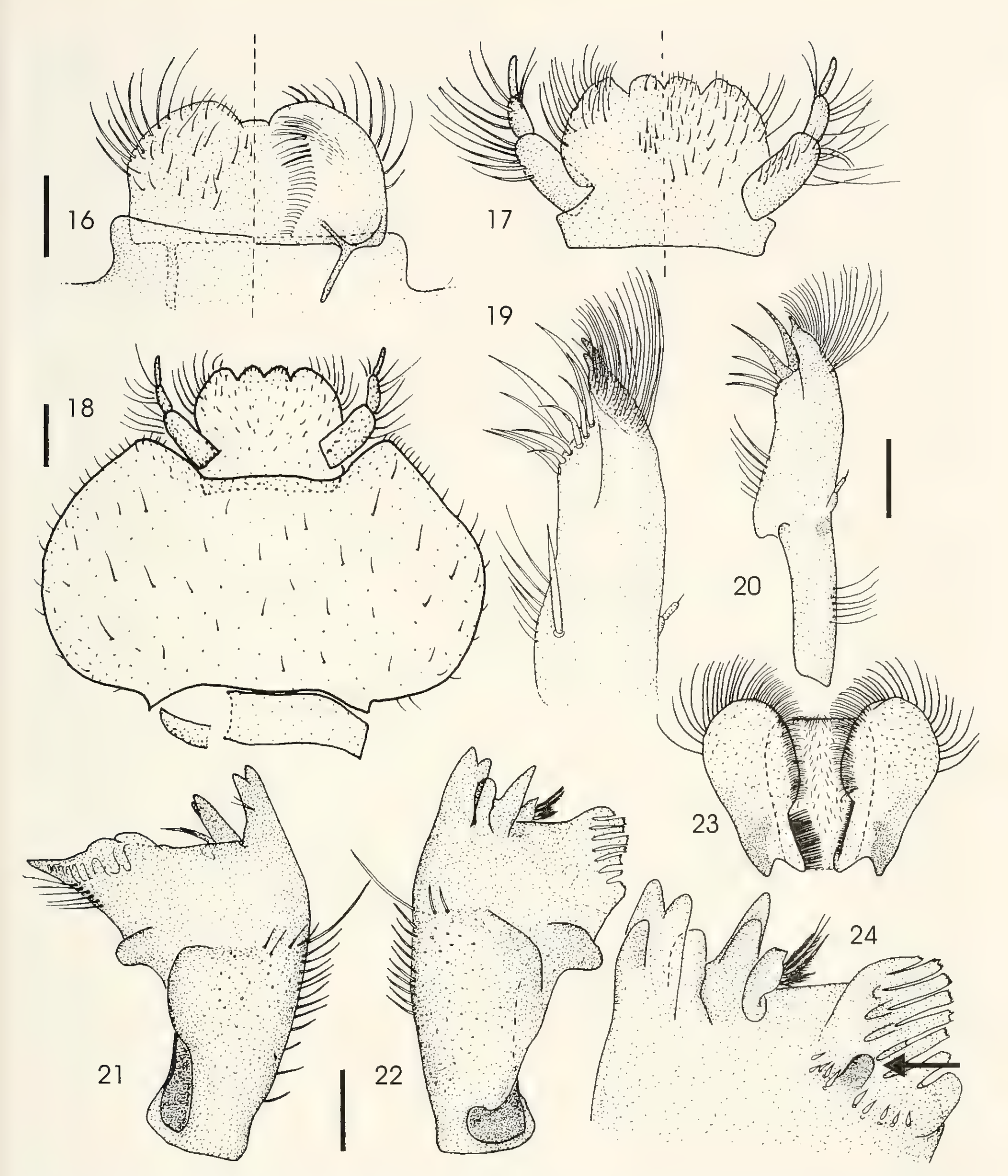
fig. 32, spines distally flattened as in fig. 31; middle and hind femora with spines on hind margin; anterior margin of tibiae of all legs with a pair of parallel rows of spines, distal spines of fore tibiae pectinated (Fig. 35); middle and hind tibiae with an additional row of spines on hind margin (Figs 33-34); fore margin of tarsi of all legs with a row of spines, cuticle of basal ½ of all tarsi darker than the rest. Tarsal claws (Fig. 36) of all legs with a marginal row of 9 denticles at basal ½, a pair of distal asymmetrical rows of denticles (4-6 submarginal denticles on one side and 1 on the other); with a subapical setae and with a pair of short setae on basal ½ of hind margin as in fig. 36.

Abdomen. Segment II laterally expanded forming the articulation of operculate gill; segments III-VII laterally expanded forming a protective floor for the gills, lateral processes rounded on segments III-VI but forming a posterolateral projection on VII; posterolateral spines present on segments VIII-IX. Terga III-VI with few small spines around gill border, terga VII with groups of long spines forming a diagonal row at each side posteriorly to apex of gills. Gills: gill of abdominal segment II (Figs 25-26) formed by an opercular dorsal lamella, ovoid and slightly curved distally, and by a pair of smaller ventral lamellae; these lamellae are dissimilar, the inferior is larger, as long as opercular lamella, and protect remaining gills from down side; opercular lamella with a pair of dorsal ribs, on ventral margin



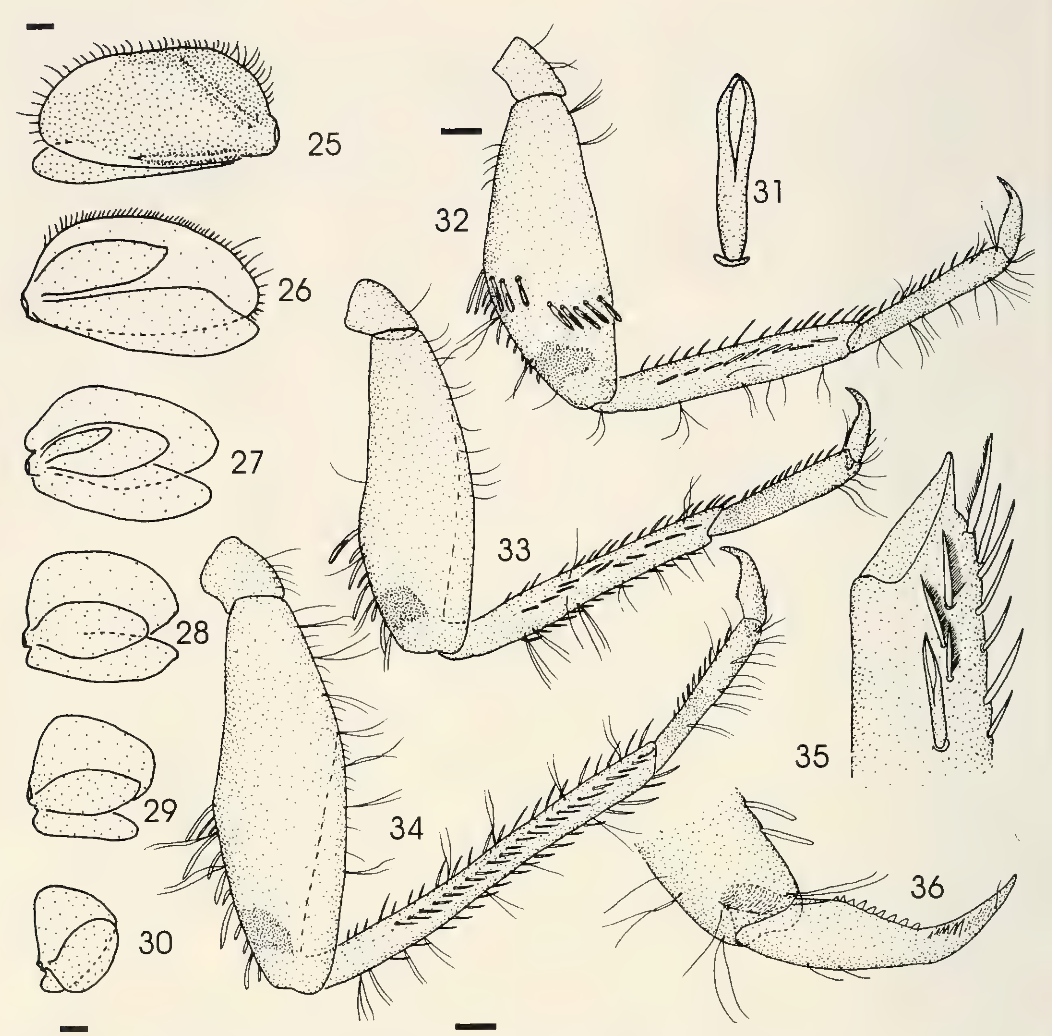
Figs 8-15. *Traverhyphes pirai*. Imagos: **8.** Genitalia, l.v. (lateral view). **9.** Detail of penes, left v.v. (ventral view), right d.v. (dorsal view). **10.** Genitalia, v.v. *Traverhyphes indicator*: **11.** Genitalia, l.v. **12.** Dorsal projection of penes, d.v. **13.** Detail of penes, d.v. at left, v.v. at right. **14.** Penes, l.v. **15.** Genitalia. v.v. Scale = 0.1 mm.

and near anterolateral border (Fig. 25). Gills III formed by four lamellae (Fig. 27), gills IV-V by three lamellae (Figs 28-29) and gills VI by two lamellae (Fig. 30). Terminal filament 10-20 % longer than body and 30 % longer than cerci, both with whorls of long spines at articulations.



Figs 16-24. *Traverhyphes indicator*. Nymph: **16.** Labrum. d.v. at left, v.v. at right. **17.** Detail of mentum, d.v. at left, v.v. at right. **18.** Labium, v.v. **19.** Detail of maxilla, v.v. **20.** Maxilla, d.v. **21.** Right mandible, d.v. **22.** Left mandible, d.v. **23.** Hypopharynx, d.v. **24.** Detail of apex of left mandible, v.v. Scale = 0.1 mm.

Eggs. Form: oval, one polar cap present (Fig. 42). Chorionic sculptures: polygonal and semicircular overlapping plates (Figs 42-43). Attachment structures: a single polar cap and numerous KTC (Knob Terminated Coiled Threads) distributed around egg surface (Figs 42-44). Micropyle: one per egg, located near the uncapped pole (Figs 42-43).



Figs 25-36. *Traverhyphes indicator*. Nymph: **25.** Gill of abdominal segment II, d.v. **26.** Same, v.v. **27.** Gill III, v.v. **28.** Gill IV, v.v. **29.** Gill V, v.v. **30.** gill VI, v.v. **31.** Fore femoral spine (detail). **32.** Fore leg, d.v. **33.** Middle leg. **34.** Hind leg. **35.** Apex of fore tibiae (detail). **36.** Fore tarsal claw (detail). Scale = 0.1 mm.

Discussion

Male genitalia of *Traverhyphes* shows many interesting characters: penes with a pair of conical spines on the dorsum (Figs 9, 13, 14, 40) near the base and with an accessory dorsal projection between penes and cerci. This projection is more or less pyramidal with setae at the tip (Figs 12, 39), and seems to continue with penes base. In the original description and subsequent emendations by Traver (1958) nothing is said about this pyramidal projection, and the same applies to a pair of long posterolateral projections of the styliger plate present in the holotype (Domínguez, pers. com.). These features clearly separate this genus from all other Leptohyphidae known from adults.

The nymphs of *Traverhyphes* do not match with any of the published nymphal descriptions. *Traverhyphes* nymphs share many characters with *Leptohyphes edmundsi* Allen and a related undescribed species collected in the same localities (Misiones, Argentina), differing from them mainly in coloration and opercular gill size and form. *Traverhyphes indicator* is not congeneric with the other two species because of the dissimilarity in male genitalia (Molineri, in prep.) and others characters discussed below.

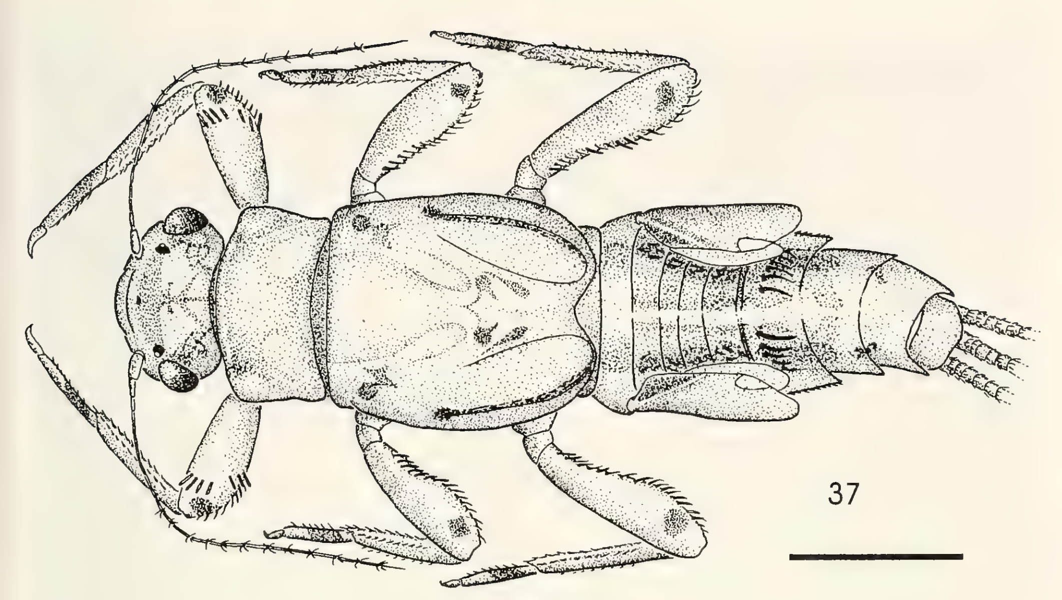


Fig. 37. *Traverhyphes indicator* nymph, dorsal view. Scale = 1 mm.

Kluge (1992) proposed some thoracic characters defining imagos of *Leptohyphes*. Almost all of them appear in a similar form in *Traverhyphes*: mesonotum with distinct transverse mesonotal suture, posterior scutal protuberances slightly divergent posteriorly and disposition of sutures on lateropostnotum of mesothorax. These character states are shared by many leptohyphid genera (except *Tricorythodes*) invalidating their use to define the genus *Leptohyphes*.

The basic structures of the egg of *T. indicator* are similar to those described for other members of the family (e.g. Koss 1968, Koss & Edmunds 1974, Kluge 1992), polar cap seems "type I" of Koss & Edmunds (1974), the chorion is sculptured with overlapping plates and a single micropyle is present near the uncapped pole. Eggs of *Traverhyphes* can be distinguished from the other described eggs of the family by the form and disposition of chorionic plates (Figs 42-43) and form of KTC (length of pedunculated part and radial disposition of fibers on the terminal knob, figs 42-44).

Imagos of *Traverhyphes* can be separated from the other members of Leptohyphidae by the following combination of characters: 1. posterolateral borders of styliger plate extended posteriorly (Figs 8, 10, 11, 15, 38); 2. hind margin of styliger plate with a pair of acute projections near the base of forceps (Figs 15, 38, 40); 3. forceps three-segmented (Figs 10, 15, 38); 4. penes almost completely fused, dorsoventrally flattened and with a pair of dorsal or laterodorsal conical spines (Figs 9, 13, 14, 38, 40); 5. dorsal projection extending from base of penes (Figs 12, 39); 6. basal ⅓ of penes forming a ring distinctly sclerotized (Fig. 13); 7. lateral margins of penes sclerotized (Figs 9, 13); 8. hind wings present in males, absent in females; 9. membranous processes of mesoscutellum long and slender (Fig. 3). Nymphs: 1. abdominal gills present on segments II-VI (Figs 26-30); 2. abdominal gill II ovoid and with a pair of ventral lamellae as in figs 25-26; 3. gills of segments III-VI as in figs 27-30; 4. maxillary palpi reduced, bisegmented with apical setae (Figs 19-20); 5. submentum enlarged (Fig. 18); 6. fore femora with a transverse row of relatively long spines (Figs 31-32); 7. middle and hind femora without transverse row of setae at base (Figs 33-34); 8. tarsal claws as in fig. 36.

Traverhyphes indicator (Needham & Murphy), comb. nov.

Figs 1-7, 11-45

Leptohyphes indicator Needham & Murphy, 1924: 33, pl. 7, figs 77-78 (male); Lestage 1931: 60; Navás 1931: 322; Traver 1958: 500, figs 3, 17, 23 (male); Hubbard 1982: 274; Domínguez 1984: 103; Domínguez et al. 1994: 99, lam. 28, figs 1-3; Molineri 2001.

Description

Male imago (in alcohol). Length: body: 3.5-3.8 mm; fore wings: 3.8-3.9 mm; hind wings: 0.65-0.78 mm. General coloration yellowish light brown. Head whitish yellow shaded with black as in fig. 2. Antennae yellowish translucent shaded with gray except flagellum translucent yellowish white.

Thorax. Lateral sclerites of pronotum yellowish shaded with black at carinae and lateral margins, membrane of the median zone whitish translucent shaded with gray; propleurae hyaline, prosternum yellowish white with brownish margins and shaded slightly with gray. Mesonotum yellowish brown except anterolateral corners, fore mesonotal transverse invaginaton and lateroparapsidal sutures brownish; and medioparapsidal sutures, region between posterior scutal protuberances (PSP) and tip of mesoscutellum yellowish white; shaded with gray on mediolongitudinal line, with a pair of blackish marks on anterolateral corners of mesoscutellum (Fig. 3). Metanotum yellowish light brown shaded with gray on hind margin. Pleural sclerites of pterothorax yellowish light brown, membranes whitish yellow; shaded with black on paracoxal suture. Meso- and metasterna with yellowish brown sclerites, median membranous zone whitish translucent shaded with gray. Legs. Coxae and trochanters of all legs yellowish shaded with gray on coxae. Femora of all legs whitish yellow with yellowish margins, with a small blackish subapical mark on dorsum. Tibiae and tarsi of all legs translucent yellowish white, shaded completely with gray on fore tibiae and fore tarsi.

Wings (Figs 1, 4-6). Membrane of fore wings hyaline slightly tinged with yellow except C and Sc areas tinged with brownish yellow, longitudinal veins brownish shaded with gray, cross veins yellowish. Hind wings (Figs 5-6) hyaline with yellowish costal projection.

Abdomen translucent whitish yellow except segments IX-X whitish yellow, shaded with black on sublateral regions of terga I-IX, heavier on segments I-VI; remaining area of terga shaded slightly with gray; median line of terga X light brownish (similar to fig. 7). Pleural folds shaded with gray, darker on segments IV-VI. Abdominal sterna translucent yellowish white. Genitalia (Figs 11-15, 38-41): styliger plate yellowish white except anterior margin yellowish and lateral margins brownish; posterolateral projections of styliger plate and forceps segment 1 yellowish translucent, remaining segments of forceps translucent yellowish white. Penes whitish translucent except dorsal pyramidal projection of penes yellowish. Cerci whitish translucent shaded slightly with gray, darker at articulations; terminal filament paler.

Female imago (in alcohol). Length: body (abdomen without eggs): 3.0-3.1 mm; fore wings: 4.3-4.4 mm. General coloration yellowish brown. Head and thorax as in male imago. Fore wings as in fig. 1. Hind wings absent. Legs as male except fore tibiae and fore tarsi, translucent yellowish white, without shading with gray. Abdomen (Fig. 7) as male imago except sternum IX yellowish white with yellowish translucent hind margin, slightly excavated apically. Tails whitish translucent.

Female subimago (in alcohol). Length: body (abdomen extended, with eggs): 4.0-5.0 mm; fore wings: 4.3-4.9 mm. Similar to imago.

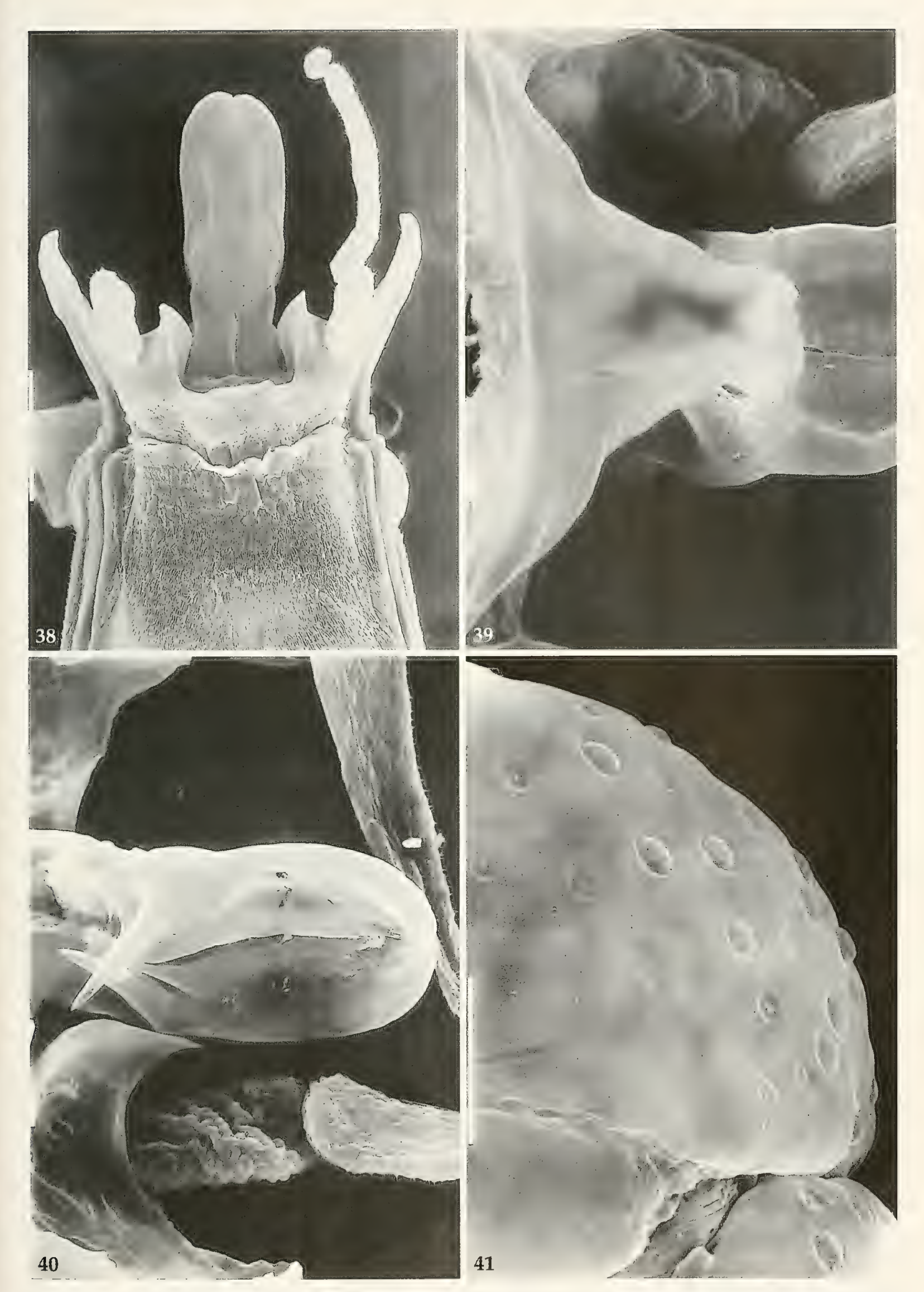
Mature nymph (in alcohol, fig. 37). Length of male: body: 3.5 mm; mesonotum: 1.3 mm; hind femora: 0.85 mm; tails: 3.2 mm. Length of female: body: 3.6-4.1 mm; mesonotum: 1.3-1.4 mm; hind femora: 0.95-1.0 mm; tails: 4.2-4.7 mm. General coloration light brownish with black markings.

Head yellowish brown shaded with black among ocelli and around antennae, occiput with grayish mediolongitudinal band and posterolateral corners. Antennae yellowish translucent. Mouthparts (Figs 16-24) yellowish shaded with gray on median zone of labium.

Thorax yellowish brown shaded widely with gray except on submedian triangular marks of pronotum; with a pair of notorious blackish ovoid marks between developing wings; developing wings yellowish translucent with blackish costal margin and black basal sclerite. Pleurae and sterna yellowish white shaded with gray. Legs whitish yellow with black subapical marks on femora (Figs 32-34); basal ½ of tarsi of all legs brownish translucent (Figs 32-34).

Abdomen yellowish brown shaded with black on anterolateral regions of terga II-IX; tergum I completely shaded with gray; shaded slightly with gray on terga II-VI, less marked on mediolongitudinal band; tergum X shaded with gray on hind margin. Abdominal sterna I-VI yellowish white, VII-IX yellowish. Gills (Figs 25-30): opercular lamellae light brown with black anteromedian margin, apical portion with depigmented maculae as in fig. 25, remaining gills translucent yellowish white. Tails yellowish translucent with whorls of long spines at articulations.

Eggs. Mean length: 182 μm; mean width: 79 μm. Color: light green, polar cap whitish. Chorion: polygonal overlapping plates near the uncapped pole, decreasing in number and becoming more or less semicircular toward the capped pole (Fig. 42). These plates sculptured with small granules on



Figs 38-41. *Traverhyphes indicator*, SEM photographies: **38.** Male genitalia, v.v. **39.** Dorsal projection of penes, d.v. **40.** Penes and base of forceps, d.v. (pyramidal projection removed). **41.** Apex of penes (right apical lobe), v.v. Scales: 38: 100 μ; 39, 40, 41: 10 μ.

thickest margin (the nearest to the uncapped pole, fig. 43). Attachment structures: a single polar cap present, formed by numerous knob terminated non-coiled threads (Figs 44-45); few knob terminated coiled threads attached between chorionic plates and on the smooth chorion rounding polar cap. These KTC increase in number toward capped pole, and consist in a basal pedunculated part formed by numerous coiled fibers located radially in the distal part, forming the knob (Fig. 43). Micropyle: one per egg, located near the uncapped pole (Fig. 42), circular or pentagonal in form and delimited by five chorionic plates (Fig. 43).
Observations. Posterolateral projections of styliger plate vary in size between subimagos and imagos, reaching its definitive form after ecdisis to imago. Two male imagos have dark spots on some longitudinal veins of fore wings, and other two male imagos have posterolateral projections of styliger plate smaller than the rest.
Life cycle associations. Nymphs and adults are associated by reared nymphs of both sexes.

Material. Holotype ♂ imago, deposited in Cornell University, Ithaca, New York, USA; drawings from wings and genitalia made by E. Domínguez. - Other material: 5♂♂, 1♀ imagos from ARGENTINA, Misiones, PN Iguazú, Puerto Canoas, 26-XI-998, at light, Domínguez, Molineri & Nieto Col.; 50♂♂, 25 nymphs from ARGENTINA, Misiones, PP Urugua-í, RP 19, A° Uruzú, 23-24-XI-1998, Domínguez, Molineri & Nieto Col.; 1♂ imago, 1♀ subimago, both reared, from ARGENTINA, Misiones, PP Urugua-í, RP 19, A° Uruzú, 7-XII-1999, Molineri Col.; 9♀♀ imagos from ARGENTINA, Misiones, Dpto. San Pedro, Confluencia Ríos Alegría y Piray-Guazú, 22-23-XI-1998, Domínguez et al. Col. Other localities in Misiones: Río Cuñá-Pirú, A° Mártires (C° Azul), Bonpland, San Vicente, El Soberbio. All the material is deposited in the collections of Instituto- Fundación Miguel Lillo, Tucumán, Argentina.

Discussion. *T. indicator* can be distinguished from *T. pirai* by the following combination of characters: 1. abdominal terga shaded with black at lateral margins, median band paler (Fig. 7); 2. penes with a similar width along their length (Figs 13, 38); 3. origin of peneal spines dorsal (Figs 13-14, 40).

Traverhyphes pirai, spec. nov.
Figs 8-10

Etymology. "Pirai" from the name of the river where the material was collected.

Description
Male subimago (in alcohol). Length: body: 3.4-3.5 mm; fore wings: 3.3-3.6 mm; hind wings: 0.60-0.73 mm. General coloration yellowish-orange. Head yellowish white shaded completely with gray except on a pair of small circular marks behind lateral ocelli; venter of head paler, not shaded with gray except laterally. Antennae: scape and pedicel whitish translucent shaded with gray [flagellum broken off and lost]. Thorax. Pronotum medially whitish translucent shaded with gray except on a pair of sublateral longitudinal bands and small scattered dots; lateral ⅓ yellowish-white shaded with gray on carinae and lateral margins; propleurae and prosternum whitish-translucent shaded with gray. Mesonotum yellowish-orange, slightly paler between medioparapsidal sutures; anterolateral margins heavy sclerotized, orangeish-brown; shaded with light gray on carinae and between posterior scutal protuberances; anterolateral corners of mesoscutellum with a small grayish mark; membranous filaments whitish translucent. Mesopleural sclerites yellowish, with whitish membranes, shaded with gray on carinae; mesosternal sclerites orangeish-yellow, median membrane whitish-translucent shaded with gray. Metanotum yellowish shaded with gray on carinae and margins; metapleurae and metasternum whitish-yellow. Legs. Coxae and trochanters of all legs yellowish-white shaded with gray dorsally; remaining segments of all legs whitish-yellow, femora of all legs with a subapical blackish mark on dorsum; fore leg shaded completely with gray, remaining legs not shaded. Wings. Membrane of fore and hind wings whitish translucent, longitudinal veins yellowish white. Abdomen translucent yellowish-white shaded with gray dorsally; shaded more marked on longitudinal submedian bands on terga II-V and on anterior margin of VI; abdominal sterna shaded with gray only at lateral margins. Genitalia (Figs 8-10): styliger plate yellowish-white; forceps and penes whitish translucent. Tails whitish-translucent.
Female and nymph. Unknown.



Figs 42-45. *Traverhyphes indicator* eggs, SEM photographies: **42.** General view of egg. **43.** Detail with micropyle and KTC. **44.** Basal part of polar cap and KTC near pole. **45.** Detail of polar cap. Scales: 42: 100μ; 43, 44: 10 μ; 45: 1.0 μ.

Material. Holotype and 5 paratypes ♂ subimagos from: Brazil, Rio de Janeiro, Mun. Rio Claro, Rio Pirai, 8-IV-1977, CM & OS Flint Jr, Cols. Holotype and three paratypes deposited in National Museum of Natural History, Smithsonian Institution, Washington D. C., USA; two paratypes deposited in Instituto-Fundación Miguel Lillo, Tucumán, Argentina.

Discussion. Male subimagos of this species can be differentiated from *T. indicator* by the following combination of characters: 1. abdominal terga shaded uniformly with gray, darker on a pair of submedian longitudinal lines on terga I-VI; 2, apical half of penes wider than basal part (Fig. 9); 3. origin of peneal spines dorsolateral (Fig. 9). Subimaginal male genitalia of *T. indicator* does not change when molting to imago, except for the relative length of the posterolateral proyections of styliger plate. For this reason already at the stage of subimago this two species are readily distinguishable.

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The larva of *Hydropsyche urgorrii* González & Malicky, 1980

(Insecta, Trichoptera, Hydropsychidae)

Rufino Vieira-Lanero, Marcos A. González & Fernando Cobo

Vieira-Lanero, R., M. A. González & F. Cobo (2001): The larva of *Hydropsyche urgorrii* González & Malicky, 1980 (Insecta, Trichoptera, Hydropsychidae). – Spixiana **24/2:** 141-146

The larva of the hitherto unknown Iberian endemic species *H. urgorrii* González & Malicky, 1980 is described for the first time and compared with other known similar Iberian species. The most important features are illustrated and some zoogeographical and ecological notes are included.

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Introduction

According to González et al. (1992) the genus *Hydropsyche* is represented in the Iberian Peninsula by 17 species. Subsequently, Botosaneanu (1999) described *H. lagranja* Botosaneanu, 1999, from Segovia (Centre of Spain) and González & Malicky (1999) described *H. iberomaroccana* (previously cited as *H.* cf. *punica*: see González et al. 1992) from several localities of southern Spain. Moreover, Malicky (1999) carried out a review of the European species of the *pellucidula*-group (with a wide representation of specimens from Spain) concluding that the Iberian specimens traditionally identified as *H. pellucidula* (Curtis, 1834) belongs, in all probability, to *H. incognita* Pitsch, 1993.

Therefore, 18 *Hydropsyche* species are known at this moment from the Iberian Peninsula: *H. acinoxas* Malicky, 1981; *H. ambigua* Schmid, 1952; *H. brevis* Mosely, 1930; *H. bulbifera* McLachlan, 1878; *H. contubernalis* McLachlan, 1865; *H. dinarica* Marinkövic, 1979; *H. exocellata* Dufour, 1841; *H. iberomaroccana* González & Malicky, 1999; *H. incognita* Pitsch, 1993; *H. infernalis* Schmid, 1952; *H. instabilis* (Curtis, 1834); *H. lagranja* Botosaneanu, 1999; *H. lobata* McLachlan, 1884; *H. modesta* Navás, 1925; *H. pictetorum* Botosaneanu & Schmid, 1973; *H. siltalai* Döhler, 1963; *H. teruela* Malicky, 1980; *H. tibialis* McLachlan, 1884; and *H. urgorrii* González & Malicky, 1980.

In the last years, several papers have been published about the larval taxonomy of the European species of this genus (see discussion), and some of these were exclusively devoted to the larvae of some Iberian species (Millet 1983, García de Jalón 1981, 1983, Zamora-Muñoz et al. 1995). So, at this moment it is possible to identify almost all the larvae of the Iberian *Hydropsyche* species, and only the larvae of three Iberian species are unknown: *H. acinoxas*, *H. lagranja* and *H. urgorrii*. These three species are endemic and belong to the *pellucidula*-group. The last instar larva of *H. urgorrii* is described in this paper for the first time.

Material examined and methods

A great number of specimens (346 larvae) of *H. urgorrii* have been collected from several sample sites of Galicia (NW Spain). For the specific determination of the aquatic stages, 6 larval exuviae collected from mature pupae with distinct genitalia were examined thereby ensuring the association between larval and adult specimens.

We have adopted in this paper the terminology of the larval characters used by Bournaud et al. (1982), Boon (1978) and De Pietro (1999).

Description of the final instar larva

Mean body length 17 mm (range 16-20 mm, N=22).

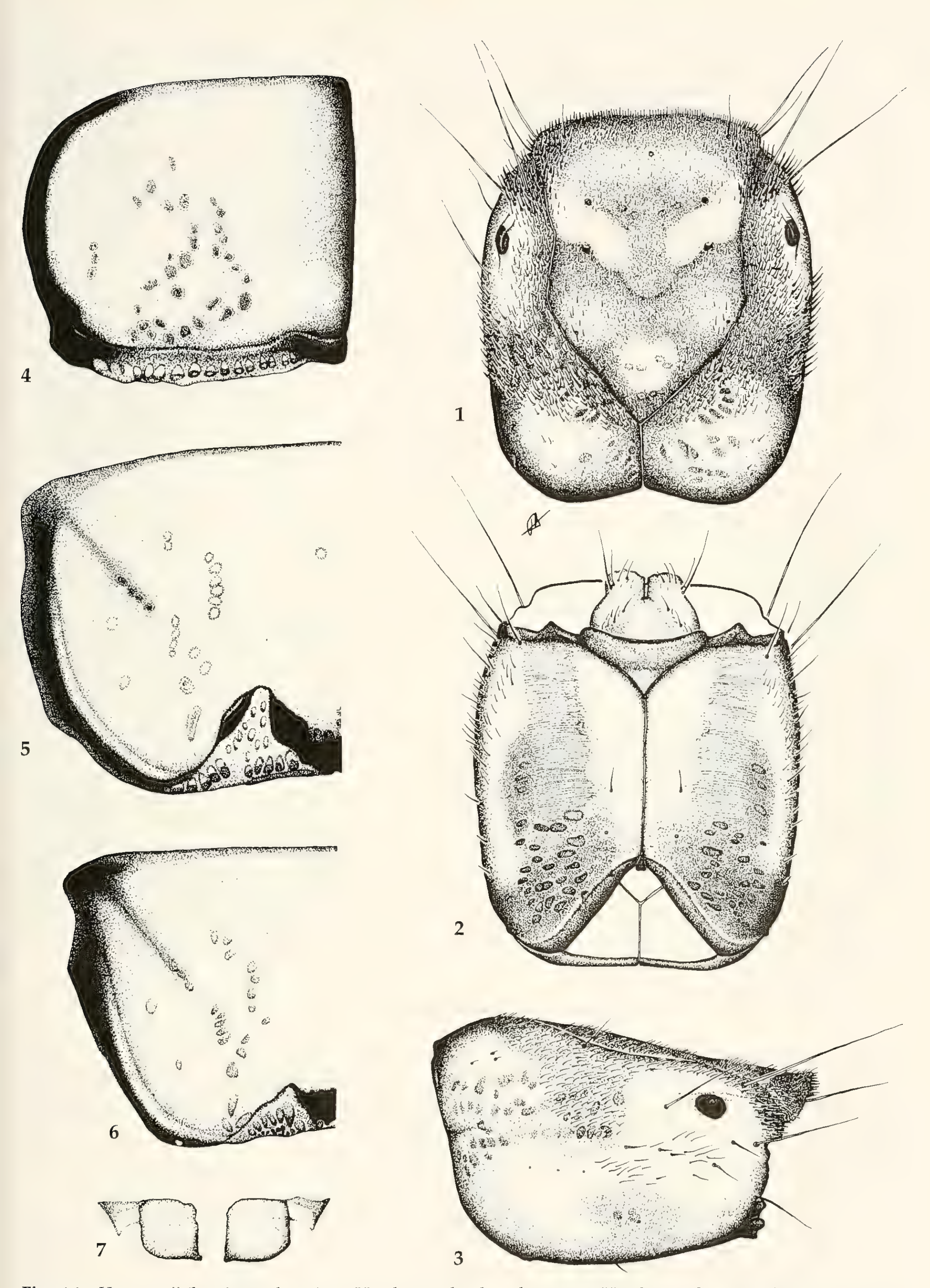
Head capsule (Figs 1-3). Almost square in dorsal view, slightly wider at eye level. Mean head length 2.1 mm (range 1.9-2.4 mm, N=22); mean head width 1.8 mm (range 1.6-2.1 mm, N=22).

The colour pattern (Fig. 1) is quite distinctive: ground colour of the head dorsum dark brown, with light spots on the frontoclypeal apotome, and a posterior, light oval area on each parietal and around the eyes. Lateral view with a light, longitudinal band, as in Fig. 3. Head pale brown in ventral view (Fig. 2), with a dark brown stridulatory band on each gena reaching the oral margin of the head. Muscle attachment spots ill-defined. Frontoclypeal apotome (Figs 1, 12) roughly pentagonal in shape. Anterior edge straight, slightly crenulate and similar in width to the posterior third. Lateral margins slightly narrower, posterior margins concave and the posterior tip pointed. Epistomal sulcus ill-defined but tentorial pits distinct; often with four muscle attachment spots on the surface, ahead of tentorial pits, and over 6 lighter spots on the posterior, rounded area. There is a characteristic light, rounded area, near the posterior tip (the "median portion aboral light spot"), and two light bands just under epistomal sulcus (the "lateral light spots"); sometimes two ill-contrasted lateral areas can also be distinguished on the epistomal sulcus (the "lateral portion aboral light spot"). A light transverse ill-defined oral area (more noticeable when the apotome is isolated) joins the bands below epistomal sulcus in some specimens (the "oral light spot"). Lateral arms of submentum (Fig. 13) long, narrow, enlarged slightly at apex. Anterior margin black brown; posterior apex lighter.

Oral pieces (Figs 8, 10, 11). Labrum (Fig. 10) elliptical in dorsal view; the dark colour of the anterior half extends to the posterior edge as a narrow central band. Labrum surface covered with numerous short setae, with small bristles between them and with well-developed lateral brushes. Six primary setae can be recognised. Mandibles (Fig. 8) roughly triangular, dark brown in colour. Left mandible with an apical and subapical tooth on dorsal blade, ventral blade with an apical and four subapical teeth, the basal subapical tooth short, rounded triangular, with a brush of long, spiny setae in the concavity, above basal tooth. Right mandible with a single tooth on dorsal blade and a obliquely row of small setae dorsally, on the tooth; ventral blade with an apical and three subapical teeth; the basal subapical tooth very short and rounded triangular. Laterally, on each mandible, there is a deep ridge with 18-24 hyaline setae and some shorter setae inserted between them. Mentum as in Fig. 11; chestnut brown in colour, setae grouped on each apical lobe and in an oblique line on each posterolateral corner; the anterior margin of each apical lobe is rounded and the median channel is straight-sided.

Thorax (Figs 4-7). Pro-, meso- and metanotum (Figs 4-6) lighter than head. Meso- and metanotum lighter than pronotum. Sclerites with a dense covering of short and strong setae ("scale-like" setae) and even shorter pointed setae between them. Anterior margin with numerous fine setae. Pronotum with a rather wide dark dorsal longitudinal band. Each hemipronotum (Fig. 4) subquadrangular in shape. Meso- and metanotum of uniform colour. The medial regions of the posterior prosternites (Fig. 7) are strongly pigmented and irregularly squarish; lateral regions lighter in colour, less distinct than the medial regions and fused with them. Protrochantin (Fig. 9) with numerous setae along ventral portion, dorsal portion downturned apically.

Abdomen. Abdominal segments I-VII with ventral gills.



Figs 1-7. *H. urgorrii* (last instar larva). **1**. Head capsule, dorsal view. **2**. Head capsule, ventral view. **3**. Head capsule, lateral view. **4**. Hemipronotum, left half. **5**. Mesonotum, left half. **6**. Metanotum, left half. **7**. Prosternites.

Discussion

We can use several larval keys for the specific identification of the European species of the genus *Hydropsyche* (e.g. Lepneva 1964, Hickin 1967, Sedlák 1971, Hildrew & Morgan 1974, Szczesny 1974, Statzner 1976, Verneaux & Faessel 1976, Boon 1978, Wiberg-Larsen 1980, Edington & Hildrew 1981, Bournaud et al. 1982, Moretti 1983, Bongard 1990, Pitsch 1993, Waringer & Graf 1997, De Pietro 1999), and for the North African species (e.g. Dakki & Tachet 1987). However, some of them may be only partially valid and serious mistakes might result from using these keys in the Iberian Peninsula.

Regarding the Iberian species of *Hydropsyche*, the larval keys of García de Jalón (1981) and Millet (1983) include only some of the Iberian species but an updated key has been recently reported by Zamora-Muñoz et al. (1995), including the first larval description of five endemic species. Thus it is possible to use this key as a starting point for this work. When using the key of Zamora-Muñoz et al. (1995), larvae of *H. urgorrii* will key out under couplet 15: the characteristics of the frontoclypeal apotome disagree with those of *H. dinarica* and *H. lobata*. The width of anterior edge of the frontoclypeal apotome of *H. dinarica* is roughly similar to the width of the posterior third (cf. García de Jalón 1983, Klima 1989, Waringer & Graf 1997, De Pietro 1999); the posterior margins are not concave, the epistomal sulcus is not distinct and the lateral light spots under it are rounded, and some specimens have an ill-defined median portion aboral light spot similar to that of *H. urgorrii* but fainter. Moreover, larval size of *H. dinarica* is greater than that of *H. urgorrii*.

The frontoclypeal apotome of *H. lobata* is very much alike to that of *H. urgorrii* but the former has a rounded posterior tip and a distinct curved edge – very conspicuous in lateral view – across the cibarian muscle attachment spots (cf. García de Jalón 1983) that is lacking in *H. urgorrii*. Moreover, the lateral portion aboral light spots of *H. lobata* are ill-defined and the colour of the posterior prosternites is also different (cf. fig. 2b in Dakki & Tachet 1987): the lateral regions are lighter than the medial ones in *H. urgorrii* but concolorous with them in *H. lobata*.

The frontoclypeal apotome of some specimens of *H. urgorrii* is very similar in colour to that of *H. brevis* (see fig. 3 in Zamora-Muñoz et al. 1995), but the posterior tip is not rounded and the lateral margins are narrower in *H. urgorrii*; moreover, the coloration of the ventral part of the head and thoracic sclerites is also different.

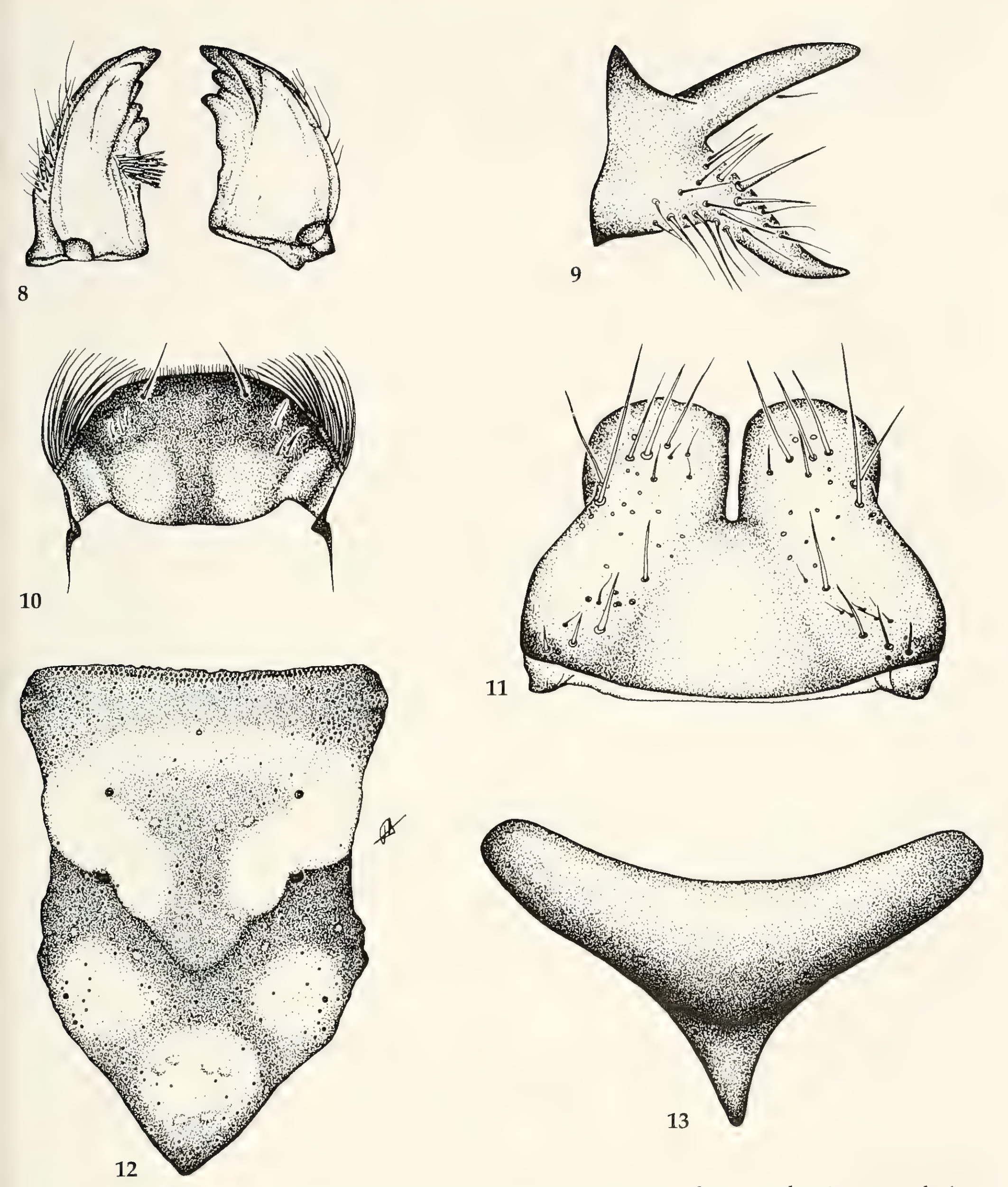
Among the eight *Hydropsyche* species with an overlapped distribution area with *H. urgorrii* (*H. ambigua, H. dinarica, H. exocellata, H. instabilis, H. lobata, H. incognita, H. siltalai* and *H. tibialis*) only the frontoclypeal apotome of *H. ambigua*, *H. dinarica* and *H. lobata* can be confused with that of *H. urgorrii*. We have already discussed the differences regarding *H. dinarica* and *H. lobata*; the larva of *H. ambigua* has been described by Zamora-Muñoz et al. (1995) and can be clearly distinguished from that of *H. urgorrii* by the shape of the frontoclypeal apotome (the lateral margins are more or less straight up to the epistomal sulcus, the posterior margins are roughly convexe and the posterior third is similar in width, or even wider, than the anterior margin), the colour pattern of this sclerite (with two rounded lateral light spots only and with a central, ill-defined, central spot, above them) and the triangular shape of the submentum (the lateral arms are short and broad).

Habitat and distribution

H. urgorrii is an endemic species of the Iberian Peninsula, where it is confined to the north-western quarter. In this area, some adults of this species have been recorded from many localities of Galicia and the north and centre of Portugal (González 1988, González et al. 1992, Terra 1994) from 15 to 500 m a.s.l. The typical habitat of this species consists of small and medium waterbeds where the larvae were found in rapidly flowing stream areas with pebbles and small rocks. In Galicia, *H. urgorrii* larvae in instars IV were present from late October to March and adults were recorded from late March to May.

Acknowledgements

We wish to thank Dr. J. Waringer who kindly provided us with specimens of *H. incognita* from central Europe. This research was supported by XUGA 20005B98 of Xunta de Galicia.



Figs 8-13. *H. urgorrii* (last instar larva). **8**. Mandibles, dorsal view. **9**. Right protrochantin, external view. **10**. Labrum, dorsal view. **11**. Mentum. **12**. Frontoclypeal apotome, dorsal view. **13**. Submentum.

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Tetrigidae from Nepal in the Zoologische Staatssammlung München

(Insecta, Orthoptera, Tetrigidae)

Sigfrid Ingrisch

Ingrisch, S. (2001): Tetrigidae from Nepal in the Zoologische Staatssammlung München (Insecta, Orthoptera, Tetrigidae). – Spixiana **24/2:** 147-155

A list of 20 species of Tetrigidae from Nepal mainly collected during the expeditions of Dr. Dierl, Dr. Forster, and Dr. Schacht in 1964,1967, and 1973 is given together with some own material. Two species are described as new: *Coptotettix muglingi*, spec. nov. and *Ergatettix minutus*, spec. nov. The material of the Dierl-expeditions and the types of the new species are deposited in the Zoologische Staatssammlung München.

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Introduction

Some years ago, I studied the Orthoptera collected during the expeditions of Dr. Dierl, Dr. Forster, and Dr. Schacht to Nepal in 1964, 1967, and 1973 (Ingrisch 1990). The Tetrigidae had to be excluded as there were no reliable tools for identification. The Tetriginae s. str. that represent the majority of the specimens at hand are not included in the works of Günther (1938a, b, 1939). Some authors even thought it impossible to identify Tetrigidae of several genera with accuracy (Kevan 1966, see also Blackith 1988). The taxonomic situation of the Tetrigidae of the Oriental Region is still in a desolate state. Numerous of the classical taxa described by Bolívar (1887), Walker (1871), or Hancock (1904, 1907, 1909, 1910, 1912, 1913, 1915) have never been re-examined and from the descriptions alone it is often impossible to be certain about their identity. A taxonomic revision of the Oriental Tetrigidae based on multivariate analysis of numerous characters that was projected by Blackith & Blackith (1987) did not appear. But meanwhile comprehensive works on the Tetrigidae of North India (Shishodia 1991) and China (Liang & Zheng 1998) are published, and there seems to be some agreement on the identity of the common species.

The present paper gives a list of species of Tetrigidae collected during the Dierl-Expeditions to Nepal. Moreover, I use the opportunity to revise some of the Tetrigidae collected during an own excursion to Nepal (Ingrisch 1987).

The Tetrigidae of the Dierl-Expeditions were collected at light and are all long-winged species. They are often widespread in North India but several of the species were not yet reported from Nepal. Information on the collection sites can be found in Dierl (1966). The own collection contained two undescribed species. All specimens of the Dierl-Expeditions and the types of the new species are deposited in the Zoologische Staatssammlung München (ZSM); few other specimens are in my own collection (CI).

List of species

Distribution according to Blackith (1992) with supplements by Shishodia (1991), type localities according to Blackith (1992) and Otte (1997). Measurements as described in Ingrisch (in press).

Scelimeninae

Eucriotettix annandalei (Hancock, 1915)
Distribution: West Bengal.
Type locality: India: West Bengal, Paresnath, 1100 m.
Locality: 1♂, Province Bagmati, Kathmandu Valley, Godavari, 1600-1800, 8.VI.1967, Dierl-Forster-Schacht (ZSM).

Loxilobus assamus Hancock, 1907
Distribution: North East India. Already recorded for Nepal by Chopard & Dreux (1966).
Type locality: India: Assam, Khasi Hills, Cherrapunji.
Locality: 1♂, 1♀, Province Sagarmatha, Jubing, 1600 m, 5.V.1964, Dierl-Forster-Schacht. Both specimens are macropronotal forms (ZSM).

Hebarditettix quadratus (Hancock, 1915)
Distribution: India (Darjeeling, Sikkim, Arunachal Pradesh).
Type locality: India: Singla, Darjeeling, 450 m.
Locality: 1♀, Syaklung (Sarka Bhanjyang), 700-1000 m, river bed, 23.X.1983, S. Ingrisch (CI), reported as *Systolederus greeni* Bolívar, 1892 in Ingrisch (1987).
Discussion. Shishodia (1991) considers that *H. quadratus* might be a synonym of *H. lobatus* (Hancock, 1912), as both taxa differ only in the length of the pronotum.

Metrodorinae

Bolivaritettix dubius (Hancock, 1912) [= syn. of *Bolivaritettix javanicus* (Bolívar, 1909) sensu Blackith 1992]
Distribution: North East India.
Type localities: of *Mazarredia dubia* Hancock, 1912 = India: Bengal, Lebong; of *Mazarredia javanica* Bolívar, 1909 = Java.
Locality: 1♂, Province Bagmati, Kathmandu Valley, Godavari, 1600-1800, 31.VII.1967, Dierl-Forster-Schacht (ZSM); 1♀, Kapurgaon – Baglungpani, 1550-2000 m, shrub rich slopes, 21.X.1983, S. Ingrisch (CI), the latter specimen reported as *Bolivaritettix lativertex* (Brunner v. W. 1893) in Ingrisch (1987).
Discussion. *Bolivaritettix dubius* (Hancock, 1912) is regarded to be a doubtful synonym of *Bolivaritettix javanicus* (Bolívar, 1909) by Günther (1939), listed as a synonym of the latter species in Blackith (1992) and Otte (1997), and treated as a separate species in Steinmann (1970) and Shishodia (1991). But so far nobody compared the types of both taxa.

Tetriginae

Teredorus carmichaeli Hancock, 1915
Distribution: North East India. Already recorded for Nepal by Bei-Bienko (1968).
Type locality: India: Darjeeling Dist., Singla.
Locality: 1♀, Province Narayani, Rapti Valley, Monahari Khola, Belwa, 350 m, 9.V.1967, Dierl-Forster-Schacht (ZSM).
Discussion. Günther (1939) restricts the genus *Teredorus* Hancock, 1906 (Type species: *Teredorus stenofrons* Hancock, 1906 from Peru) to American species and includes the Asian species described under *Teredorus* in *Systolederus* Bolívar, 1887, while recent authors follow Hancock (1915) and include also Asian species in *Teredorus* (Shishodia 1991, Blackith 1992, Otte 1997, Liang & Zheng 1998). However the taxonomic relations of both genera are still unresolved.

Teredorus frontalis Hancock, 1915
Distribution: North East India.
Type locality: Himalaya: Dharampur, Simla Hills, 1200 m.
Localities: 1♂, Syaklung (Sarka Bhanjyang), 700-1000 m, river bed, 23.X.1983, S. Ingrisch; 1♀, Trisuli between Fishling – Mugling Bazar, river bed, 26.X.1983, S. Ingrisch (CI), both specimens reported as *Systolederus gravelyi* Günther, 1939 in Ingrisch (1987).

Hedotettix attenuatus Hancock, 1904
Distribution: India, Sri Lanka.
Type locality: Sri Lanka: Kesbewa, Colombo.
Localities: 17♂♂, 16♀♀, Province Narayani, Rapti Valley, Jhavani, 200 m, 15.-18.V.1967, Dierl-Forster-Schacht; 1♂, 1♀, Province Narayani, Rapti Valley, Monahari Khola, Belwa, 350 m, 10.-11.V.1967, Dierl-Forster-Schacht; 1♂, Province Bagmati, Kathmandu – Chauni, 1400 m, 16.IV.1967, Dierl-Forster-Schacht (all ZSM).

Hedotettix costatus Hancock, 1912
Distribution: India, Bangladesh, Nepal, Sulawesi.
Type locality: India: Bengal, Pusa.
Localities: 6♂♂, 9♀♀, Province Narayani, Rapti Valley, Jhavani, 200 m, 15.-18.V.1967, Dierl-Forster-Schacht; 5♂♂, 4♀♀, Province Narayani, Rapti Valley, Monahari Khola, Belwa, 350 m, 10.-11.V.1967, Dierl-Forster-Schacht (all ZSM).

Hedotettix spec. (near *H. attenuatus* Hancock, 1904 and *H. costatus* Hancock, 1912)
Localities: 1♀, east of Pokhara, 700 m, wasteland within rice fields, 13.-14.X.1983, S. Ingrisch; 2♂, north of Ghanpokhara, 2000-2300 m, meadows, 20.X.1983; 1♂, south of Ghanpokhara, 2000 m, meadows, 20.X.1983, S. Ingrisch; 1♀, Ghanpokhara – Kapurgaon, 2000 m, shrub rich cultural land, 21.X.1983, S. Ingrisch; 3♂♂, 5♀♀, Baglungpani, 1550 m, meadows, 21.X.1983, S. Ingrisch (all CI).
Discussion. A *Hedotettix* species lives on subalpine meadows in the Annapurna area of western Nepal that cannot be assigned with certainty to any of the named species. It was reported as *H. costatus* in Ingrisch (1987), but it differs from specimens of *H. costatus* collected in the Rapti Valley as well as from *H. attenuatus* to which it is also similar. It occurs in the macroponotal and brachypronotal morph as well as in intermediate forms. Additional material should be evaluated before the status of those populations can be settled with certainty.

Hedotettix gracilis (de Haan, 1843)
Distribution: Sulawesi, Sunda, Java, Sumatra, Bangladesh, India, Myanmar, Sri Lanka, Taiwan, Thailand, Vietnam.
Type locality: Java.
Localities: 1♂, Province Narayani, Rapti Valley, Monahari Khola, Belwa, 350 m, 10.V.1967, Dierl-Forster-Schacht; 1♀, Province Narayani, Rapti Valley, Jhavani, 200 m, 15.V.1967, Dierl-Forster-Schacht (all ZSM).

Hedotettix grossus Hancock, 1915
Distribution: North East India.
Type locality: Himalaya: Singla, Darjeeling.
Locality: 1♀, Province Narayani, Rapti Valley, Monahari Khola, Belwa, 350 m, 10.V.1967, Dierl-Forster-Schacht (ZSM).

Coptotettix conspersus Hancock, 1915
Distribution: North East India, Sri Lanka.
Type locality: India: Bengal, Siliguri.
Localities: 1♂, 2♀♀, Province Narayani, Rapti Valley, Jhavani, 200 m, 15.V. 1967, Dierl-Forster-Schacht; 1♂, 4♀♀, Province Narayani, Rapti Valley, Monahari Khola, Belwa, 350 m, 6.-11.V.1967, Dierl-Forster-Schacht; 1♀, Province Bagmati, Kathmandu Valley, Godavari, 1600-1800, 31.VII.1967, Dierl-Forster-Schacht (all ZSM).

Coptotettix annandalei Hancock, 1915

Distribution: North East India, North Myanmar, Nepal.

Type locality: India: Darjeeling, Singla.

Localities: 1♂, east of Pokhara, 700 m, river bed and wasteland within rice fields, 13.-14.X.1983, S. Ingrisch; 1♀, Trisuli, Jugedee, river bed and cultural land, 27.-28.X.1983, S. Ingrisch; 1♂, Terai: Chitawan, Gaida-Camp, river bed, savannah, evergreen forest, 28.-29.X.1983, S. Ingrisch (all CI).

Discussion. Recorded already under the same name in Ingrisch (1987), the specimens from Mugling Bazar however represent a new species (see below). It is possible that this taxon is a mixture of morphologically similar, sibling species as already Hancock (1915) in the original diagnosis and later Shishodia (1991) describe some geographic variation. If so, the specimens at hand might represent an undescribed species, but the material is not enough to solve the problem. The specimens at hand agree with the descriptions in Hancock (1915) and Shishodia (1991) except for the following points: The vertex is not even slightly narrowing anteriorly and is 1.4 × wider than one eye in the female and of equal width with one eye in the males (1.0-1.1 × as wide as one eye) instead of narrower than one eye. Since no exact values are given in the previous descriptions the relative width of both organs was probably guessed not measured. The anterior margin of the pronotum is truncate in the male from Chitawan which agrees with the original diagnosis, while it is a little convex in the male from Pokhara and in the female. The pronotum bears tubercles between the shoulders which are not very striking in the male from Chitawan and in the female, but rather striking in the male from Pokhara. The frontal costa differs somewhat between the three specimens at hand: It is widening ventrad but rather wide throughout in the male from Chitawan, widening ventrad but rather narrow except at the medial ocellus in the male from Pokhara, and gradually widening ventrad in the female.

Coptotettix muglingi, spec. nov.

Figs 1-6

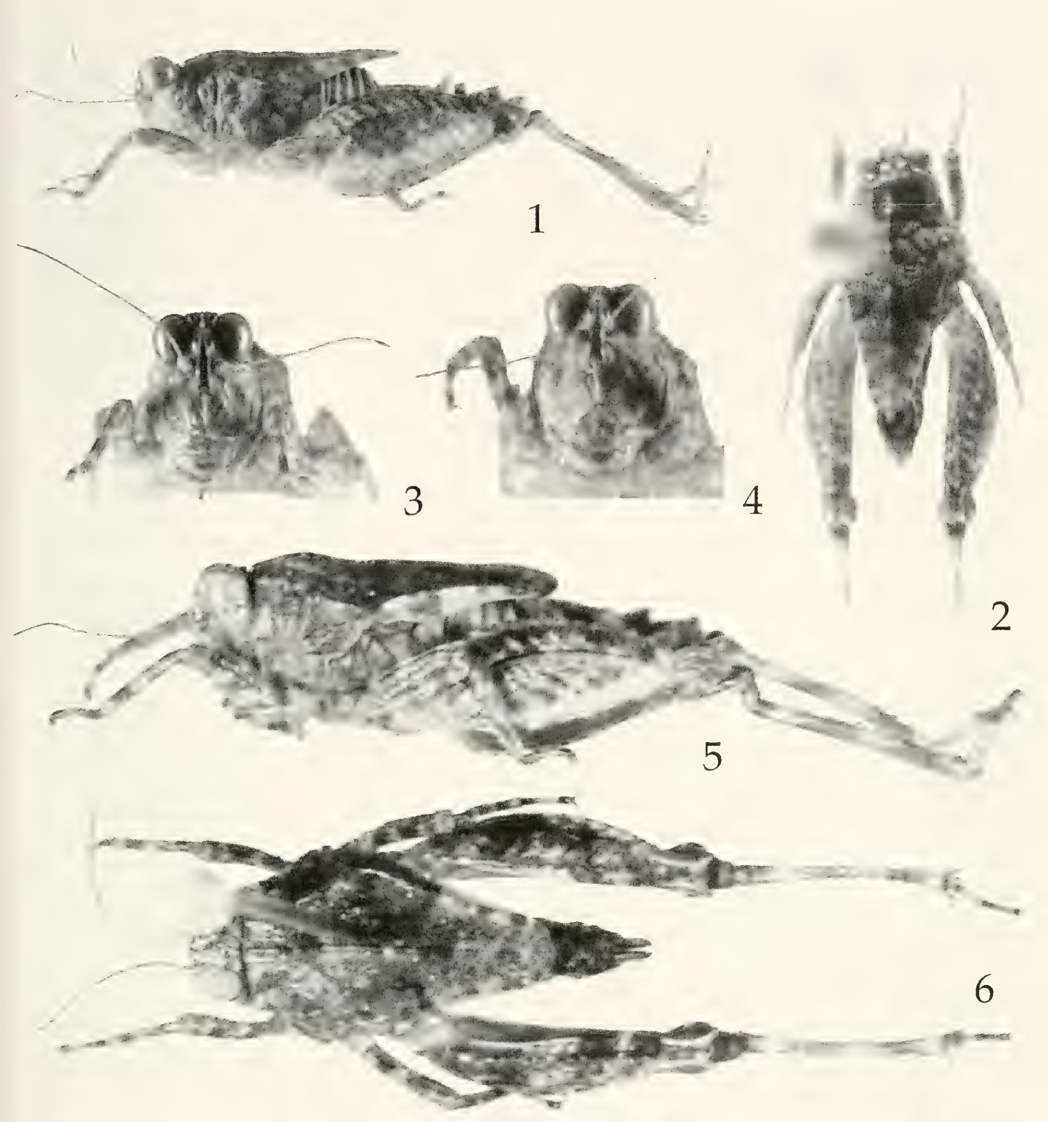
Coptotettix annandalei (nec Hancock, 1915) Ingrisch, 1987 partim.

Types. Holotype: ♂, Nepal: Trisuli river near Mugling Bazar, river bed, 26.X.1983, S. Ingrisch (ZSM). – Paratypes: 2♀♀, Trisuli river near Mugling Bazar, river bed, 26.X.1983, S. Ingrisch (1♀, ZSM; 1♀, CI).

Description

Small brachynotal species with small lanceolate tegmina and strongly reduced wings. Integument granular and slightly tuberculate.

Head with eyes not (female) or little excerted (male). Vertex 0.9 × (female) or 0.8 × (male) as wide as one eye; anterior margin truncate, not completely reaching anterior margin of eyes; medial carina distinct, running to end of fossulae; fossulae deep, elongate; lateral carinae raised to dorsal margin of eyes. Frontal costa in lateral view projecting in front of eyes, rounded together with vertex but slightly concave above lateral ocelli; in anterior view widened about halfway between dorsal angle and lateral ocelli, moderately wide dorsal, suddenly more widened between lateral ocelli and antennae, and then gradually widened ventrad; between antennae 0.8-0.9 × as wide as scapus. Antennae inserted between ventral margins of eyes such that the middle of the antennal scrobae and the base of the scapus are placed between the ventral margins of eyes. Pronotum not completely covering abdomen, reaching about middle of postfemur; surface granular and a little tuberculate; anterior margin truncate or very faintly convex; posterior margin broad obtuse-angularly rounded; prozonal carinae sharp, almost parallel (or very little converging posteriorly); medial carina low, a little convex from anterior margin to behind sulci, substraight (female) or faintly undulate (male) thereafter; internal lateral carinae absent, lateral margins of disc of pronotal process formed by the external lateral carinae. Paranota with ventral margin slightly curved laterad; ventral projection distinct with apex roundly truncate; dorsal projection in male present, its shape short triangularly rounded, in female reduced to a weak convexity; ventral margin of pronotal process convexly expanded behind tegmen (more expressed in the female than in the male). Tegmen with free part small, lanceolate, 3.1-4.0 × longer than wide in female, 2.5-3.6 × longer than wide in male (varying between left and right tegmen of holotype); hind wing projecting 0.3 mm behind tegmen in male; in female hidden or absent. Femur I and II setose; femur I stout with dorsal margin convex and indistinctly undulate; femur II compressed and widened (in



Figs 1-6. *Coptotettix muglingi*, spec. nov.: **1-3.** Male, holotype. **4-6.** Female, paratype. **1,5.** Lateral view. **2,6.** Dorsal view. **3, 4.** Frons.

female 2.7-2.8 ×, in male 2.4 × longer than wide), dorsal and ventral margins faintly (in male indistinctly) undulate. Postfemur very thick (2.2 × longer than wide), granular and rugose; dorsal margin serrulate. Hind tarsus with first segment 1.6-1.7 × (female) or 1.9 × (male) longer than third segment; posterior metatarsus with pulvilli spinose, variable in length: third pulvillus the longest one, second pulvillus longer than or of subequal length with first pulvillus. Ovipositor with dorsal valve 2.3-2.6 × longer than wide.

Measurements (in mm): body length ♂ 6.89, ♀ 7.87-7.93; vertex width ♂ 0.44, ♀ 0.53; eye width ♂ 0.55, ♀ 0.58-0.59; frontal costa between antenna ♂ 0.22, ♀ 0.22-0.24; frontal costa at ventral end ♂ 0.28, ♀ 0.31; scapus width ♂ 0.25, ♀ 0.27; antennal length ♂ 3.75, ♀ 3.75-3.94; pronotum length ♂ 4.62, ♀ 5.17-5.27; pronotum shoulder width ♂ 2.24, ♀ 2.6; pronotum lobe width ♂ 3.15, ♀ 3.38-3.45; tegmen length ♂ 0.63, ♀ 0.78-0.88; femur I length ♂ 1.63, ♀ 1.76-1.82; femur II length ♂ 1.79, ♀ 1.95-2.02; femur II width ♂ 0.75, ♀ 0.72; postfemur length ♂ 4.81, ♀ 5.27; postfemur width ♂ 2.18, ♀ 2.37-2.41; hind tarsus I length

♂ 0.89, ♀ 0.94-0.97; hind tarsus III length ♂ 0.47, ♀ 0.56-0.59; dorsal ovipositor valve length 0.88; dorsal ovipositor valve width 0.34-0.38.

Discussion. The new species differs from most species described under *Coptotettix* by the strongly reduced tegmina and wings and the short pronotum reaching only the middle of the postfemur. It is similar to *Paratettix hancockus* (Shishodia & Varshney 1987) [= replacement name for *Coptotettix parvulus* Hancock, 1912)]. The new species differs from the original description of *C. parvulus* by the frontal costa of the head which is distinctly expanded between the lateral ocelli and the antennae (not evenly widened forward), and the antennae are inserted between the lower margins of the eyes (not between the lower part of the eyes). From the redescription of *P. hancockus* in Shishodia (1991), the new species differs by the vertex which in strict dorsal view does not reach the anterior margin of the eyes (not reaching front margin), the apex of the pronotum is distinctly obtuse angular (not broadly rounded), the paranota have two projections (not one projection).

Paratettix hirsutus Brunner v. W., 1893
Distribution: Assam, Myanmar.
Type locality: Burma: Bhamo.
Locality: 1♂, 2♀♀, Province Narayani, Rapti Valley, Jhavani, 200 m, 15.V. 1967, Dierl-Forster-Schacht (ZSM).
Discussion. The specimen at hand are smaller than the measurements given in Brunner v. W. (1893) and Shishodia (1991).

Euparatettix corpulentus Hancock, 1912 [= syn. of *Euparatettix variabilis* (Bolívar, 1887) ?]
Type locality: of *E. corpulentus*: India: Bengal, Chapra; of *E. variabilis*: Philippines.
Localities: 2♂♂, 2♀♀, Province Bagmati, Kathmandu – Chauni, 1400 m 23.-29.VI.1967, Dierl-Forster-Schacht; 2♀♀, Province Narayani, Rapti Valley, Jhavani, 200 m, 15.V. 1967, Dierl-Forster-Schacht; 1♀, Province Bagmati, Kathmandu Valley, Godavari, 1600-1800, 8.VI.1967, Dierl-Forster-Schacht (all ZSM).
Discussion. This and the following species are currently listed under the synonymy of *Euparatettix variabilis* (Bolívar, 1887) (Naskrecki & Otte 1997), a species covering an area from India to the Solomon Islands. As in my opinion the taxonomic status of the numerous synonyms of *E. variabilis* (see catalogues of Blackith 1992 and Otte 1997) is still unresolved, I prefer for the moment to use Hancock's (1912) names for this and the following species, the more as the specimens at hand that should belong to *E. variabilis* according to the current synonymy obviously belong to two different species.

Günther (1938b) treats *Euparatettix variabilis* (Bolívar, 1887) as a synonym of *Pseudoparatettix histricus* (Stål, 1861). Shishodia (1991) lists *Euparatettix corpulentus* Hancock, 1912 under the synonymy of *Euparatettix histricus* (Stål, 1861), *Euparatettix tenuis* Hancock, 1912 as a separate species. Naskrecki & Otte (1997) list both *E. corpulentus* and *E. tenuis* under the synonymy of *E. variabilis* (Bolívar, 1887), and *Pseudoparatettix histricus* (Stål, 1861) as a separate species. Blackith (1992) lists *E. variabilis* twice, as a separate species and under the synonymy of *Pseudoparatettix histricus* (Stål, 1861).

Euparatettix tenuis Hancock, 1912 [= syn. of *Euparatettix variabilis* (Bolívar, 1887) ?]
Type locality: of *E. tenuis*: India: Bengal, Pusa; of *E. variabilis*: Philippines.
Locality: 3♀♀, Province Narayani, Rapti Valley, Monahari Khola, Belwa, 350 m, 9.-12.V.1967, Dierl-Forster-Schacht (ZSM).
Discussion. See under *E. corpulentus*.

Ergatettix dorsiferus (Walker, 1871)
Distribution: India, Sri Lanka, Bangladesh, Myanmar, Afghanistan, Iran, China, Taiwan, Central Asia, Sumatra, Java, Sumba Island.
Type locality: India: Bombay.
Localities: 8♂♂, 8♀♀, Province Bagmati, Kathmandu – Chauni, 1400 m, 24.VI.1967, Dierl-Forster-Schacht; 1♂, Province Bagmati, Kathmandu – Chauni, 1400 m, 29.IV.1967, Dierl-Forster-Schacht; 3♂♂, 2♀♀, Province Narayani, Bhainse Dobhan, 730 m, 16.-20.VII.1967, Dierl-Forster-Schacht; 11♂♂, 11♀♀, Province Narayani, Rapti Valley, Jhavani, 200 m, 15.-19.V.1967, Dierl-Forster-Schacht; 10♀♀, Province Narayani, Rapti Valley, Monahari Khola, Belwa, 350 m, 6.-12.V.1967, Dierl-Forster-Schacht (all ZSM).

Discussion. In the series at hand, there are all transient forms from specimens with barely rugose to such with distinctly rugose pronotum, with or almost without lateral undulating projections in apical area of pronotum, and with distinct or almost without rugose lateral projections on lateral surface of postfemora; i.e. from *Ergatettix guentheri* Steinmann, 1970 (= replacement name for *Indatettix nodulosus* (Hancock, 1915)) to *Ergatettix dorsiferus* (Walker, 1871). Thus the former might be only a synonym of the latter as already pointed out by Hebard (1929); no further separation between both forms is done. There are specimens with pale and others with annulated posttibia in the same population (see keys in Hancock 1915 and Shishodia 1991); thus *Ergatettix crassipes* (Hancock, 1912), in which the posttibiae are said to be subinornate, is probably also a synonym of *Ergatettix dorsiferus* (Walker, 1871) (see also Shishodia 1991 who lists *E. crassipes* under the synonymy of *E. dorsiferus*).

The species was already recorded from Nepal as *Ergatettix nodulosus* Hancock, 1915 in Bei-Bienko (1968) and as *Ergatettix crassipes* (Hancock, 1912) in Ingrisch (1987).

Ergatettix minutus, spec. nov.

Figs 7-10

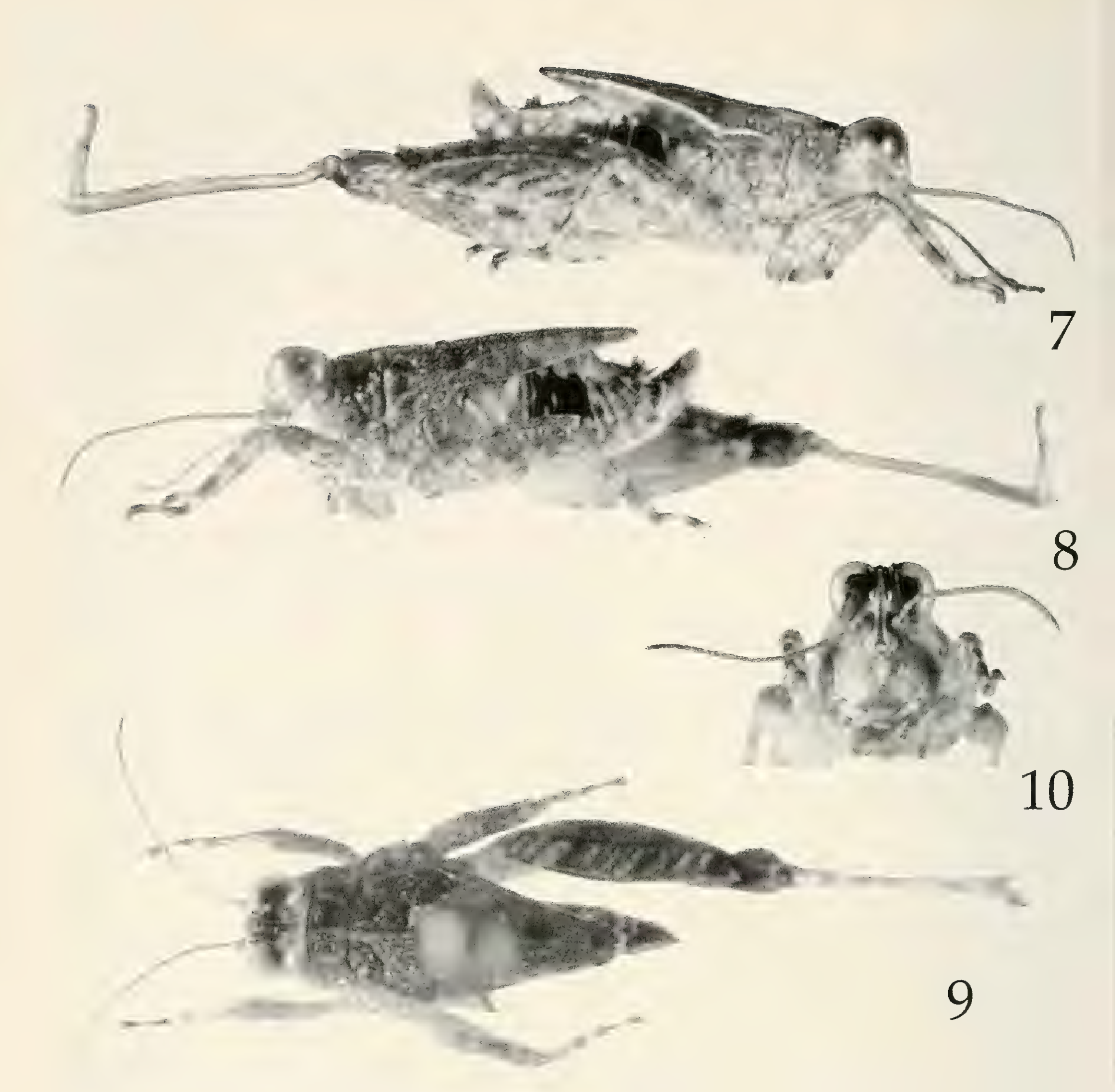
Types. Holotype: ♂, Nepal: East of Pokhara, 700 m, river bed and wasteland within rice fields, 13.-14.X.1983, S. Ingrisch (ZSM).

Description

Small, brachynotal species with excerted head, greatly reduced tegmina and hind wings; integument granular and a little tuberculate.

Head with eyes distinctly excerted above pronotum. Vertex 0.7 × as wide as one eye; anterior margin not completely reaching anterior margin of eyes, slightly convex on both sides of projecting medial carina; vertex a little depressed with medial and lateral carinae almost raised to dorsal margin of eyes; fossulae shallow. Frontal costa in lateral view very little projecting between eyes, hardly concave above lateral ocelli, distinctly projecting between antennae; in anterior view forked about halfway between dorsal angle and lateral ocelli, gradually widening ventrad; between antennae 0.6 × the width of scapus. Antennae inserted between ventral margin of eyes thus that the middle of the antennal scrobae and the scapus base lie in the same level with the ventral margin of the eyes. Pronotum reaching about middle of postfemur; surface granular and with scattered tubercles; anterior margin subtruncate; posterior apex broadly rounded; prozonal carinae low, parallel; medial carina distinct but low, in lateral view faintly convex between sulci and faintly depressed between shoulders, almost straight. Paranota with two projections, dorsal projection however reduced to a weak convexity; ventral projection with apex faintly curved laterad, subtruncate (very little convex); ventral margin of pronotal process concave at tegmen, convexly expanded behind concavity. Tegmen and hind wings greatly reduced, almost completely hidden under pronotum. Femur I strong with dorsal margin convex and indistinctly undulate and faintly serrulate; femur II compressed and widened (2.3 × longer than wide), with an indistinct preapical constriction, dorsal margin finely serrulate, ventral margin granular. Postfemur thick (2.5 × longer than wide), granular, dorsal and ventral margins indistinctly serrulate. Tibia II narrowed ventrad. Hind tarsus with first segment 1.5 × longer than third segment; posterior metatarsus with third pulvillus longer than first and second pulvilli, all three pulvilli spinose. Measurements of male (in mm): body length 5.59; vertex width 0.34; eye width 0.48; frontal costa between antenna 0.16; frontal costa at ventral end 0.23; scapus width 0.25; antenna length 3.66; pronotum length 3.84; pronotum shoulder width 1.69; pronotum lobe width 2.34; tegmen length 0.41; hind wings projecting behind tegmen 0.38; femur I length 1.34; femur II length 1.47; femur II width 0.64; postfemur length 4.03; postfemur width 1.59; hind tarsus I length 0.69; hind tarsus III length 0.47.

Discussion. The new species is similar to *Paratettix hancockus* (Shishodia & Varshney, 1987). It differs by the distinctly excerted head, by the vertex being much narrower than one eye, by the anterior margin of the vertex not reaching the anterior margin of the eyes, and by the paranota of pronotum having two projections. It looks quite different from two other brachynotal *Ergatettix* species recently described from Nepal (Ingrisch in press). From *Ergatettix undunotus* Ingrisch in press, it differs by the frontal costa being less concave above the lateral ocelli, by the pronotum being only little rugose and its dorsal margin almost straight (not distinctly undulate), by the apex of the pronotum being broadly rounded



Figs 7-10. *Ergatettix minutus*, spec. nov., male, holotype. **7-8.** Lateral view. **9.** Dorsal view. **10.** Frons.

(not narrow truncate), by the expansion of the ventral margin of the pronotal process, and by the extremely reduced tegmina and hind wings. From *Ergatettix elevatus* Ingrisch in press, it differs by the head being not extremely expanded dorso-ventrally, by the pronotum with the carinae not so strongly expressed but the surface distinctly granular (not rather smooth with tubercles) and its apex rounded (not triangular), by the expansion of the ventral margin of the pronotal process, by the extremely reduced tegmina and hind wings, and by the femur II being widened (not narrow, elongate).

Bannatettix menghaiensis Zheng, 1993
Distribution: South China.
Type locality: China: Yunnan.
Locality: 1♀, Province Narayani, Rapti Valley, Monahari Khola, Belwa, 350m, 12.V.1967, Dierl-Forster-Schacht (ZSM).

Acknowledgements

The material on which this study is based was kindly made available by Dr. M. Baehr (München).

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14. Mitchell-Jones, A. J. et al.: The Atlas of European Mammals. – Academic Press, London, 1999. 484 S., zahlr. Abb. ISBN 0-85661-130-1.

Bereits im Jahr 1988 wurde vom *Secretariat de la Fauna et de la Flore* in Paris ein Projekt initiiert, das vorsah, die aktuelle geographische Verbreitung aller europäischen Säugetierarten darzustellen. Entsprechend dem zugrundeliegenden Konzept wurden von Spezialisten in den einzelnen Ländern jeweils nationale Verbreitungskarten erstellt, die dann von Koordinatoren zusammengefaßt und vereinheitlicht wurden. Das Ergebnis liegt nun in Form eines übersichtlichen Werkes vor, das neben Rasterkarten auch kurzgefaßte Textinformationen zur Verbreitung, zur geographischen Variation, zum Lebensraum und zur Bestandssituation der behandelten Arten enthält. Leider wurden von den ehemaligen Staaten der Sowjetunion nur die drei baltischen sowie das Gebiet um Königsberg erfaßt. Rußland, Weißrußland, die Ukraine und Moldawien wurden nicht berücksichtigt. Dafür sind die Kanarischen Inseln, Madeira und die Azoren eingeschlossen sowie alle Mittelmeerinseln, die politisch zu einem europäischen Staat gehören. Grundlage der Verbreitungskarten ist das UTM-Netz mit einer Kantenlänge von 50 × 50 km. Dabei wird unterschieden zwischen sicherem Verkommen, das heißt, Quadranten, in denen die Art nach 1970 belegt ist und unsicherem Vorkommen bzw. Nachweisen, die vor 1970 datieren und nicht aktualisiert werden konnten.

Das Buch vermittelt einen sehr informativen Überblick über die Verbreitungsmuster der europäischen Säugetiere und den Verlauf von Arealgrenzen. Darüberhinaus liefert es eine wichtige Grundlage für ein zukunftsorientiertes Biomonitoring, vor allem im Hinblick auf anthropogen verursachte Arealänderungen.

R. Kraft

15. Dillon, R. T.: The Ecology of Freshwater Molluscs. – Cambridge Univ. Press, Cambridge, 2000. xii + 509 pp. ISBN 0-521-35210-X.

After more than 20 years this is the first comprehensive review of the voluminous, recent literature on the subject, i.e. worldwide freshwater molluscs. Ecology is understood in a broad sense: The book starts with two chapters on autecology of bivalves and gastropods including feeing and digestion, habitat preferences and reproduction. Life history and intraspecific population dynamics are covered by separate chapters as are competition, parasitism and predation. Also the problem of neozoans (introduced species) is shortly treated, whereas endangered species or extinction problems do not receive attention. Most interesting the author presents a new model of life-history unifying most of the above mentioned aspects.

The reference list is extensive and cites as much as 1.200 papers, most of them published in the last 20 years. One of the missed "classics" is Frömming's (1956) "Biologie der mitteleuropäi-schen Süßwasserschnecken" with its extremely rich content of original autecological data on many mid-European species, and I also expected the consideration of the extensive paper by Johnson et al. (in: Streit et al.: Evolutionary Ecology of Freshwater Animals, Birkhäuser 1997) on the evolution and ecological correlates of uniparental and biparental reproduction in freshwater snails.

Nevertheless, Dillon's "Ecology" certainly is a a very good synthesis of a very high number of recent papers, and thus a must for malacologists, evolutionary genetists, and freshwater biologists, too. G. Haszprunar

16. Beesley, P. L., G. J. B. Ross & C. J. Glasby (eds.): Polychaetes & Allies: The Southern Synthesis. Fauna of Australia. Vol. 4A: Polychaeta, Myzostomida, Echiura, Sipuncula. – CSIRO Publ., Melbourne/Australia, 2000. xii + 465 pp. ISBN 0-644-05483-2 (set), 0-643-06571-7.

This second volume on Australian invertebrates in the *Fauna of Australia* series is much more than an account of Australian worms. All included taxa are treated extensively concerning biology, phylogeny, taxonomy, classification, history, ecology, and zoogeography making the volume a real encyclopedic work – certainly a "must" for everyone who is interested in these groups. Of particular use are the reviews of the smaller groups Myzostomida and Pogonophora – to my knowledge the first comprehensive treatment since 40 years. In addition, the volume contains a very detailed description of the morphology, anatomy and biology of 80 % of polychaete families worldwide.

Phylogeny and consequently classification of all treated taxa is still controversial. The book largely follows a pragmatic approach, but the various authors correctly mentioned the differing points of view.

The only thing to criticize is the entire lack of scale bars and measurements in all figures of the chapters Myzostomida and Sipuncula, whereas figures of the remaining chapters are very accurately scaled.

The reader will be very pleased by extensive reference lists of each chapter and an extremely useful glossary and index at the end of the volume. The beauty of the treated taxa is shown by several marvellous colour tables. To conclude: Systematics and biology of "Polychaetes & Allies" have done a major step forwards. Congratulations to all people involved. G. Haszprunar

SPIXIANA	**24**	2	157–163	München, 01. Juli 2001	ISSN 0341-8391

Description of two new species of *Notiobia* Perty from Southern Venezuela

(Insecta, Coleoptera, Carabidae, Harpalini)

Erik Arndt & David W. Wrase

Arndt, E. & D. W. Wrase (2001): Description of two new species of *Notiobia* Perty from Southern Venezuela (Insecta, Coleoptera, Carabidae, Harpalini). – Spixiana **24/2:** 157-163

Two new species of *Notiobia* Perty are described from South America. *N. variabilis*, spec. nov. is one of the largest known species, most similar to *N. disparilis* Bates but has equally developed convex elytral intervals in both sexes. It is known from several localities in the Amazonian lowlands. *N. acuminata*, spec. nov., known only from the type locality, is one of the smallest species and is distinguished from the similar *N. flavicincta* (Erichson) and *N. umbrifera* Bates by its peculiar lanceolate aedeagus. Both species belong to the fruit fall communities in primary rain forests.

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Introduction

Species of the Neotropical subgenus *Notiobia* Perty of the harpaline genus *Notiobia* are part of the animal community associated with fruit fall in tropical forests. Therefore, local and time restricted fruit fall events in the forests cause complicated ecological adaptations of *Notiobia* (s. str.) species. All known species are adapted to specific tree genera (or families). The winged adults arrive in the trees when ripe fruits are available, at least in part before the fruit fall begins (Paarmann, pers. comm.). After fruit fall, females lay eggs in the ground of the fruit fall area. Larval *Notiobia* are spermatophagous and develop only on fruit fall of specific trees as shown by Arndt et al. (1996) and Paarmann et al. (in press). Mandibular configuration of larval *Notiobia* species is strongly associated with the particular seed. The larvae of *N. pseudolimbipennis* Arndt and *N. flavicincta* (Erichson) feed on *Ficus* (Moraceae). They have extremely elongated, straight and slender mandibles with 4-5 terebral teeth. Mandibles of a similar structure occur in the larva of *N. nebrioides* Perty, which feeds on seeds of Clusiaceae. Larvae which feed on seeds of Melastomataceae have a short mandible with fewer terebral teeth (Arndt et al. 1996).

At present 24 species of *Notiobia* (s. str.) are known. The Mexican species were revised by Noonan (1973). Arndt (1998) revised the species of Brazil including all known taxa from the Amazonian lowlands. During a research project in Southern Venezuela, two new species were discovered which are described here.

Material and methods

Beside the types of the described species, material of the following museum and private collections was examined:

CMP	Carnegie Museum of Natural History (Pittsburgh, U.S.A., R. Davidson).
INPA	Instituto Nacional de Pesquisas da Amazônia (Manaus, Brazil, C. R. V. Fonseca)
IRSNB	Institut Royal des Sciences naturelles de Belgique (Bruxelles, Belgium, K. Desender)
MPM	Milwaukee Public Museum (Milwaukee, U.S.A., G. Noonan)
NMNH	National Museum of Natural History (Washington, U.S.A., T. L. Erwin, M. G. Pogue)
ZSM	Zoologische Staatssammlung (München, Germany, M. Baehr)
cEA	Coll. E. Arndt (Leipzig, Germany)
cKI	Coll. S. Kirmse (Erfurt, Germany)
cWR	Coll. D.W. Wrase (Berlin, Germany)

The total body length was measured from the tip of the right mandible to the elytral apex at a magnification of 10 × using an ocular micrometer in a SM 20 stereobinocular microscope (Carl Zeiss Jena). Line drawings were prepared using an ocular grid (15 × 15 squares) attached to a SM 20 stereobinocular microscope. Dissections were made with standard techniques. Median lobes were preserved in Euparal on transparent labels and pinned together with the appropriate specimen.

Description of species

Notiobia (s. str.) *variabilis*, spec. nov.

Figs 1, 3, 4

Types. Holotype: ♂, Venezuela, Amazonas, Orinoco region, Rio Surumoni near La Esmeralda, 03.10N/65.40W, 12.03.1999, leg. S. Kirmse (ZSM). – Paratypes: 3♂♂, (27.02.1999, 01.02.1999, 12.03.1999), 4♀♀ (27.10.1997, 13.11.1997, 12.01.1999, 27.01.1999) from the same locality and collector (ZSM, cEA, cKI, cWR).

Other material studied: Brazil, state Amazonas, Lago Janauarí near Manaus, 03.20S/60.17W (4 specimens, INPA and cEA); state Rio Grande do Sul, Santo Augusto (1 specimen, CMP); "Chapada" (2 specimens, CMP); Bolivia, dept. Santa Cruz, Rio Ichilo, Buenavista (6 specimens IRSNB, 1 specimen CMP), Santa Cruz (1 specimen MPM); dept. Cochabamba, Rio Chapara, 400 m (ZSM), dept. del Sara (1 specimen CMP); Peru, prov. Madre de Dios, Rio Manu, Pakitza (101 specimens, NMNH); prov. Loreto, Rio Amazonas, Caño Yanamona, 100 m (56 specimens, NMNH), Rio Napo, Rio Sucusari 100 m (26 specimens, NMNH), Rio Samiria (3 specimens, NMNH).

Description

Body length. 11.4-14.0 mm (Holotype 12.6 mm).

Color. Dull, black, or dorsum with slight green metallic lustre.

Head. Labrum straight anteriorly; frons with foveae punctiform; clypeus broadly emarginate; eyes large and protruding. Mentum with prominent median tooth, mentum and submentum completely separated by a transverse suture; paraglossa slightly longer than ligula. Microsculpture of isodiametric meshes, micropunctures present.

Thorax. Pronotum with sides arcuate anteriorly, and straight in the most posterior part; posterior angles rectangular, base lobed; lateral depression deep, not widened posteriorly; lateral bead complete, basal and anterior beads only distinct at the sides, absent in the middle. A setigerous puncture in the middle of lateral groove. Median line present. Microsculpture of very fine transverse meshes and micropunctures.

Legs. Dorsa of tarsi with single small hairs except the posterior tarsi of females which are glabrous. Hairs on anterior and median tarsi of males more numerous than those on posterior tarsi, hairs on anterior tarsi of females more numerous than those of middle tarsi. Anterior and median tarsi of males strongly expanded laterally.

Elytra. Scutellar striae moderately long, posteriorly turning to stria I, with a basal setigerous puncture; all intervals equally and comparably convex, subapical sinuation moderate in both sexes; sutural angles acute. Elytral intervals with micropunctures, all intervals equally microsculptured with smooth to finely granulate isodiametric mesh (in the sense of Arndt 1998); interval III with a setigerous puncture in apical third; interval VII complete, with a small setigerous puncture near apex or not complete, ending before apex, then setigerous puncture in striae between intervals VIII and VI;



Fig. 1. Habitus of *Notiobia variabilis*, spec. nov. (paratype).
Fig. 2. Habitus of *Notiobia acuminata*, spec. nov. (paratype).

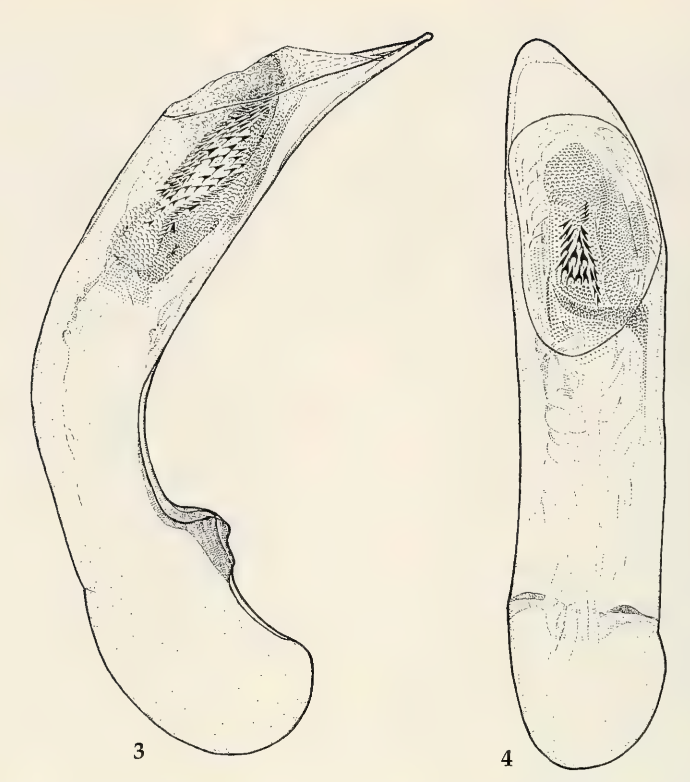
proximal puncture present. Hind wings fully developed in all examined specimens.

Abdomen. Sternum VI of females evenly rounded apically, with two pairs of setae; sternum VI of males with one pair of ambulatory setae. Aedeagus with median lobe moderately long with rounded apex (Figs. 3, 4).

Distribution. Amazonian lowlands in Brazil, South Venezuela, East Peru, Central and East Bolivia.

Etymology. The name was proposed by H. W. Bates for this species.

Discussion. *Notiobia variabilis*, spec. nov. is a widespread species and present in several museum collections. Bates already labeled this species with the name *N. variabilis* (IRSNB) but did not describe it. *N. variabilis* is most similar to *N. disparilis* Bates, but has equally developed convex elytral intervals in both sexes, whereas *N. disparilis* has equally convex intervals in males but flat intervals 1, 3, 5, and 7 as well as convex intervals 2, 4, and 6 in females. *N. variabilis* was found to develop on fruit falls of *Goupia glabra* (Celastraceae).



Figs 3, 4. Aedeagus of *Notiobia variabilis,* spec. nov. **3.** Lateral aspect (holotype). **4.** Dorsal aspect (paratype).

Notiobia (*s. str.*) *acuminata*, spec. nov.

Figs 2, 5, 6

Types. Holotype: ♂, Venezuela, Amazonas, Orinoco region, Rio Surumoni near La Esmeralda, 03.10N/65.40W, 17.12.1998, leg. S. Kirmse (ZSM). – Paratypes: 28♂♂, 7♀♀ from the same locality and collector (1♂, 1♀ 17.09.1997, 1♀ 22.09.1997, 11♂♂ 15.12.1998, 5♂♂ 17.12.1998, 1♂ 19.12.1998, 1♂ 1.1.1999, 1♂ 12.1.1999, 1♂ 17.1.1999, 1♂ 21.1. 1999, 2♂♂ 23.1.1999, 1♂ 25.1.1999, 1♂, 2♀♀ 27.1.1999, 1♀ 30.1.1999, 2♀♀ 14.02.1999, 1♂ 24.02.1999, 1♂ 28.12.1999) (ZSM, cEA, cKI, cWR).

Description

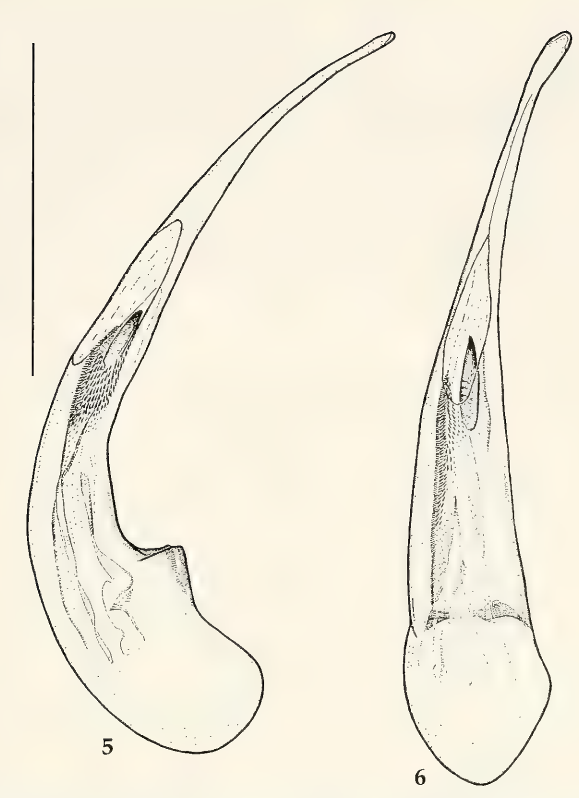
Body length. 8.9-9.9 mm (HT 9.9 mm).

Color. Dorsum with labrum yellow to red brown, remaining parts of head, pronotum, and elytra greenish to cupreous with metallic lustre; ventral part of body generally brown; legs and palpi yellowish; antennae yellowish to piceous.

Head. Labrum straight anteriorly; clypeus broadly emarginate; frons with foveae punctiform, bearing a distinct clypeo-ocular prolongation to eyes; eyes large and protruding. Mentum with prominent median tooth, mentum and submentum completely separated by a transverse suture; paraglossa slightly longer than ligula. Microsculpture of fine isodiametric meshes, micropunctures present.

Thorax. Pronotum with sides arcuate anteriorly, and straight in the most posterior part; posterior angles variable, from slightly concave lateral margin with rectangular angle to straight lateral margin with obtuse angle; base lobed; lateral depression flat, not widened posteriorly; lateral bead complete, basal and anterior beads only distinct at the sides, absent in the middle. A setigerous puncture near widest point of pronotum in anterior half. Median line present. Microsculpture of very fine transverse meshes and micropunctures.

Legs. Dorsa of anterior tarsi with scattered small hairs, dorsa of middle and posterior tarsi glabrous. Anterior and median tarsi of males strongly expanded laterally.



Figs 5, 6. Aedeagus of *Notiobia acuminata*, spec. nov. **5.** Lateral aspect (holotype). **6.** Dorsal aspect (paratype). Scale bar 1.5 mm (Figs. 3-6).

Elytra. Scutellar striae long, extended to a fourth of elytral length, posteriorly more or less turning to stria I, with a basal setigerous puncture; inner intervals flat, becoming more convex towards the lateral margin; subapical sinuation moderate in both sexes; sutural angles acute. Inner elytral intervals of males green, shining, with fine transverse meshes and micropunctures, whereas lateral two (anterior part of elytra) to four intervals (posterior part) are more or less pale, covered with granulate micro-sculpture; pale and granulate region of lateral intervals strongly enlarged in females, covering in some specimens the whole elytra except the medio-subapical part. Interval III with a setigerous puncture in apical third; interval VII with a small setigerous puncture near apex and with proximal puncture. Hind wings fully developed in all examined specimens.

Abdomen. Sternum VI of females evenly rounded apically, with two pairs of setae; sternum VI of males with one pair of ambulatory setae. Aedeagus with median lobe extremely elongate (Figs. 5, 6).

Distribution. Known only from the type locality (Venezuela, state Amazonas).

Etymology. The name refers to the acuminate and elongate median lobe of aedeagus.

Discussion. *N. acuminata*, spec. nov. was found on fruit falls of *Miconia* species (Melastomataceae). The species resembles *N. flavicincta* (Erichson) and *N. umbrifera* Bates in habitus and colour. But it is distinguished from both species by its peculiar aedeagus, from *N. umbrifera* also by its extended granulate and pale region of lateral elytral intervals.

Key to the adults of *Notiobia* (*s. str.*) species from Amazonian lowland

1. Elytral intervals different in males and females. Males with intervals of elytra convex, dorsum of males bicolored in most specimens, head and pronotum golden green-cupreous, elytra black with purple tinge; median lobe of aedeagus with short but wide apex. Females with convex intervals 2, 4 and 6, but flat intervals 1, 3, 5, and 7; dorsum of females uniformly dark colored .... *N. disparilis* Bates
– Elytral intervals of the same shape in males and females, dorsum not bicolored .... 2.
2. Elytral intervals metallic green, with uniform microsculpture and not granulate; microsculpture of intervals reticulate or lacking; lateral parts of elytra not yellowish; subapical sinuation of elytra never prominent .... 9.
– Postero-lateral intervals of elytra with a region of distinct granulate microsculpture and/or light yellowish, remaining median part of elytra shining, with reticulate microsculpture, not granulate, OR species with elytra black with convex intervals and uniform granulate microsculpture; subapical sinuation of elytra prominent or not .... 3.
3. Subapical sinuation of elytra prominent; dorsum green, bronze or blue-green, lateral intervals in part pale yellow-testaceous .... 4.
– Subapical sinuation of elytra not prominent; dorsum of variable color .... 5.
4. Sternum VI of females produced into a ventrally projected spine ; median lobe of male aedeagus with short but wide apex; elytra distinctly bicolored, with lateral intervals granulate, pale yellow-testaceous and inner intervals green-cupreous; in females granulated area in the anterior part enlarged, covering the full anterior part of elytra .... *N. viridula* (Dejean)
– Sternum VI of females rounded apically; median lobe of male aedeagus with longer and more narrow apex; elytra not distinctly bicolored in most specimens; granulate area of elytra anteriorly not expanded to the middle part, dorsal surface more shining, green, cupreous or black with greenish, bluish or purple lustre .... *N. pseudolimbipennis* Arndt
5. Body length 11-15 mm; elytral intervals uniformly colored, black or cupreous .... 6.
– Body length 7-10 mm; lateral intervals of elytra, in some females whole elytra except a preapical macula, granulate and pale yellow-testaceous, inner intervals green or cupreous .... 7.
6. Body length 11-13 mm; elytra cupreous, rarely black with blue or cupreous lustre, inner intervals flat and shining, lateral intervals more convex and slightly granulate; median lobe of aedeagus acuminate. Anterior tarsi of males peculiarly narrow .... *N. nebrioides* Perty
– Body length 13-15 mm; elytra black, dull or with cupreous or bluish lustre, all intervals convex, more or less distinctly uniformly granulate; aedeagus rounded. Anterior tarsi of males wide .... *N. variabilis*, spec. nov.
7. Median lobe of aedeagus slender, with rounded apex, apex not elongate. Pale region of lateral intervals strongly enlarged in females; anterior tarsi of males very wide .... *N. flavicincta* (Erichson)
– Median lobe of aedeagus elongate, lanceolate or spatula-shaped, not rounded. Pale region of lateral intervals extended or not .... 8.
8. Median lobe of aedeagus very slender, apex elongate (Figs. 5, 6); pale region of lateral intervals enlarged in some females; 8.9-9.9 mm; anterior tarsi of males wider .... *N. acuminata*, spec. nov.
– Apex of median lobe of aedeagus elongated, spatula-shaped (laterally depressed); pale region of lateral intervals in both sexes narrow, sometimes indistinct; body length usually 7-8 mm; anterior tarsi of males narrower .... *N. umbrifera* Bates
9. Elytra very smooth and shining, microsculpture even in the outer intervals indistinct, intervals not completely flattened; posterior angles of pronotum not blunt, fairly sharp, subdentate. Median lobe of aedeagus always rounded apically .... 10.

– All intervals of elytra with equal and distinct microsculpture, elytra dull, intervals very flat, separated from each other only by a faint row of punctures; posterior angles of pronotum blunt. Median lobe of aedeagus more or less acuminate. Length 9-10.5 mm. (Note: Larger specimens of 11-13 mm length with shining inner intervals, dull, slightly granulate outer intervals, and narrow anterior male tarsi, see *N. nebrioides* Perty) .... *N. aulica* (Dejean)

10. Body length 13-15 mm; median lobe of aedeagus wide and stout; apical part of everted internal sac with irregularly distributed, isolated large spines .... *N. maxima* Arndt

– Body length 10-12 mm; median lobe of aedeagus comparatively slender; everted internal sac dorso-basally with a field of 5-25 large spines .... *N. glabrata* Arndt

Discussion

The number of known species of *Notiobia* (s. str.) increased to 26 (or 27 respectively, if one follows van Emden 1953 and includes *Anisotarsus concinnus* Erichson in *Notiobia* s. str.). That of known species from Brazil increased from 11 to 12 with the record of *N. variabilis* in the Amazonian lowlands. *Notiobia viridula* (Dejean), *N. disparilis* Bates and *N. glabrata* Arndt were collected with the newly described species by S. Kirmse at the study site near La Esmeralda in southern Venezuela. All three species are recorded for the first time in Venezuela.

The newly described species confirm the spermatophagy of larvae and adaptation to fruits of a single tree family in this subgenus of ground beetles.

Acknowledgements

We thank Susan Kirmse (Institute of Botany, University of Leipzig) for donating the type material of the new species and Robert L. Davidson (Carnegie Museum, Pittsburgh) for linguistic improvement of the manuscript. We are very grateful to the curators of the afore mentioned institute collections for sending their specimens and the support during the stay of the first author in their institutes respectively. We are very indebted to M. Hornschuh (Berlin) who took the photographs of the *Notiobia* species.

Zusammenfassung

Zwei Arten der Laufkäfergattung *Notiobia* Perty werden aus Süd-Amerika beschrieben. Die über weite Teile des Amazonas-Tieflands verbreitete *N. variabilis*, spec. nov. ist groß, matt, schwarz oder mit leicht metallischem Glanz und hat konvexe, granulierte Flügeldeckenzwischenräume. Von der ähnlichen Art *N. disparilis* Bates unterscheidet sie sich durch gleichmäßig ausgebildete Flügeldeckenzwischenräume bei den Weibchen. *N. acuminata*, spec. nov. gehört zu den kleinsten beschriebenen Arten, mit glänzender grüner bis kupferfarbener Oberseite mit Ausnahme der helleren, matt granulierten äußeren Flügeldeckenzwischenräume. Diese Art ist bisher nur vom locus typicus aus Süd-Venezuela bekannt und unterscheidet sich von den beiden ähnlichen *N. flavicincta* Erichson und *N. umbrifera* Bates durch ihren sehr langen, lanzettförmigen Aedeagus-Fortsatz. Beide neuen Arten wurden auf Fruchtflächen in Primärwäldern gefunden.

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Paarmann, W., Adis, J., Stork, N., Gutzmann, B., Stumpe, P., Staritz, B., Bolte, H., Küppers, S., Holzkamp, K., Niers, C. & C. R. V. Fonseca (in press). The structure of ground beetle communities (Col., Carabidae) at fig fruit falls (Moraceae) in a Terra Firme rain forest near Manaus (Brazil). – Ecotropica

17. Pölking, F. & U. Walz: Störche. Leben auf der Kathedrale. – Tecklenborg Verlag, Steinfurt, 1996. 76 S., 83 Farbfotos, geb. ISBN 3-924044-25-2.

In Alfaro – einem kleinen Städtchen am Ebro im Norden Spaniens – sind die Bilder zu diesem Storchenbuch entstanden. Auf dem Dach der dortigen Kathedrale San Miguel befindet sich die größte Weißstorch-Kolonie der Erde mit 109 Brutpaaren im Jahr 1996 – das entspricht fast genau dem Brutbestand Bayerns! Die eindrucksvollen Farbaufnahmen aus dieser Kolonie geben einen Einblick in das Brutgeschäft der Weißstörche und immer wieder in Übersichtsbildern die für den Mitteleuropäer kaum faßbare Dichte der Horste auf Türmen und Simsen, in Glockenstühlen und auf Dachschrägen. Für die Qualität der Aufnahmen bürgen die Namen der Autoren – hier haben zwei der renommiertesten Tierfotografen Deutschlands zusammengearbeitet und ein Ergebnis erzielt, das einfach begeistert. Beim Blick auf den Text fällt zunächst auf, daß die Abbildungstexte sehr blaßgrau gedruckt sind und dem Leser einige optische Anstrengung abverlangen. Es wäre angebrachter gewesen, diese Textteile farbig zu setzen. Der fortlaufende Text ist inhaltlich sehr allgemein gehalten. Die Angaben lassen sich in fast jedem der in den letzten Jahren erschienenen Storchenbücher nachlesen. Im Bemühen um populäre Formulierungen wurde manchmal etwas zu dick aufgetragen. Kostprobe: "Dem Freund erlesener Liedbeiträge aus der Kehle gefiederter Sangeskünstler haben die Störche sehr wenig zu bieten ..."

Der Weißstorch ist übrigens auch nicht der größte europäische Brutvogel, wie auf Seite 25 behauptet wird. Es ist schade, daß sich der lokale Bezug der Bilder im Text nicht wiederfindet; man erfährt fast nichts über die Lebensbedingungen in der Umgebung, die eine derart einmalige Konzentration an brütenden Störchen ermöglichen. Wegen des Textes lohnt sich die Anschaffung des Buches nicht; sie ist jedoch wärmstens zu empfehlen, wenn man in der Schönheit der Bilder schwelgen und sich an der Tatsache erfreuen möchte, daß es eine solche Storchenkolonie überhaupt gibt. R. Pfeifer

18. Flade, J. E.: Die Esel. Haus- und Wildesel. *Equus asinus.* – Westarp Wissenschaften-Verlags-GmbH Hohenwarsleben, 2000 (Die Neue Brehm-Bücherei Bd. 638). 122 S., 40 Abb., 20 Tab. ISBN 3-89432-887-8.

Im Mittelpunkt des Buches stehen die Domestikation und Zucht des Hausesels, seine Ausbreitung, sein wirtschaftlicher Nutzen und seine kulturgeschichtliche Bedeutung in den verschiedenen Kulturen und Epochen. Auch die Zucht, Eigenschaften und Verwendung des Maultieres werden relativ ausführlich abgehandelt. Leider fehlen vergleichbare Angaben zum Maulesel. Weitere, eher kurz gefaßte Kapitel beschäftigen sich mit der Systematik und Stammesgeschichte der Equidenfamilie allgemein sowie mit dem Körperbau und Verhalten des Hausesels. Ein abschließendes Kapitel gibt Hinweise zur Haltung von Eseln. Gerade die zoologischen Aspekte werden etwas kurz und oberflächlich abgehandelt. Auch fallen einige Unstimmigkeiten auf. So wird der Kiang einmal als eigene Art (mit drei Unterarten) geführt, an anderer Stelle wiederum als Unterart des Onagers klassifiziert. Auch die Stammartenfrage wird nicht ganz widerspruchsfrei beantwortet. So wird einmal der Nubische Wildesel als alleiniger Stammvater des heutigen Hausesels genannt, bei der Einteilung der Hausesel-"Rassen" werden die ägyptisch-arabisch-spanischen Formen jedoch als "Somali-Esel" bezeichnet, wobei aber unausgesprochen bleibt, ob es sich dabei tatsächlich um Abkömmlinge dieser Unterart des Wildesels handelt. Verwirrend ist auch, daß Poitou- und Gascogne-Esel zu eben dieser Gruppe, gleichzeitig aber auch zur Gruppe der europäischen Esel gerechnet werden.

Der kulturgeschichtlich interessierte Leser wird in dem Buch interessante Angaben finden. Der Informationsgehalt der biologischen und systematischen Kapitel ist dagegen eher gering. Insgesamt rechtfertigen Inhalt und Umfang nicht den relativ hohen Preis des Buches. R. Kraft

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A new species of the genus *Lissopogonus* Andrewes from northern Borneo

(Insecta, Coleoptera, Carabidae, Patrobinae)

Martin Baehr

Baehr, M. (2001): A new species of the genus *Lissopogonus* Andrewes from northern Borneo (Insecta, Coleoptera, Carabidae, Patrobinae). – Spixiana **24/2:** 165-169

Lissopogonus borneensis, spec. nov. from Sabah and Brunei, northeastern Borneo, is described. The species is distinguished from the four described species (*glabellus* Andrewes, 1923, *poecilus* Andrewes, 1933, *suensoni* Kirschenhofer, 1991, and *tonkinensis* Zamotajlov & Sciaky, 1996) by the combination of uniformly dark colouration, rather depressed, laterally evenly convex elytra, and differently shaped aedeagus.

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Introduction

Within carabid material recently collected by W. Schawaller, Staatliches Museum für Naturkunde, Stuttgart (SMNS) in Sabah, northeastern Borneo, I detected a fairly large series of an apparently undescribed *Lissopogonus* species. Later I received several specimens through courtesy of Mr. D. Wrase, Berlin, which were collected in different parts of Sabah and in Brunei.

This genus of rather strangely shaped ground beetles was so far known from four species, namely *L. glabellus* Andrewes, 1923 from the southern part of the Himalayas to northern Laos, *L. poecilus* Andrewes, 1933 from Java, *L. suensoni* Kirschenhofer, 1991 from eastern China, and *L. tonkinensis* Sciaky, 1996 from North Vietnam. From Borneo, thus far no records were available.

Although originally described as a genus of Pogoninae, *Lissopogonus* has been recently transferred by Zamotajlov & Sciaky (1996) to Patrobinae – with fairly good reasons, as I believe. However, as both authors already stated, its position is quite isolated within Patrobinae, and perhaps the genus requires an own subgroup.

Perhaps all *Lissopogonus* are mountain living beetles, though at least the newly described species mentioned in this paper apparently lives at rather low altitude. Generally, very little is known about habits and way of life of any species. Not even the altitude range is known, because in the descriptions rarely any indication to altitude is noted. Most probably, species of *Lissopogonus* are ground living inhabitants of the forest floor of montane (rain) forests.

Measurements

Measurements have been made under a stereo microscope by use of an ocular micrometer. length has been measured from apex of labrum to apex of elytra. Measurements, therefore, may slightly differ from those of other authors.



Fig. 1. *Lissopogonus borneensis*, spec. nov. Habitus. Length: 5.1 mm.

Material and Methods

Altogether 41 specimens of the new species were available for this study. For the taxonomic treatment standard methods were used. The genitalia were removed from specimens soaked for a night in a jar under wet atmosphere, then cleaned for a short while in hot KOH.

The material is shared between Staatliches Museum für Naturkunde, Stuttgart (SMNS), collection D. Wrase, Berlin (CWR), and the working collection of the author in Zoologische Staatssammlung, München (CBM).

Genus *Lissopogonus* Andrewes

Lissopogonus Andrewes, 1923: 213; Andrewes 1926: 68; 1933: 275; 1935: 314; Kirschenhofer 1991: 9; Zamotajlov & Sciaky 1996: 40.

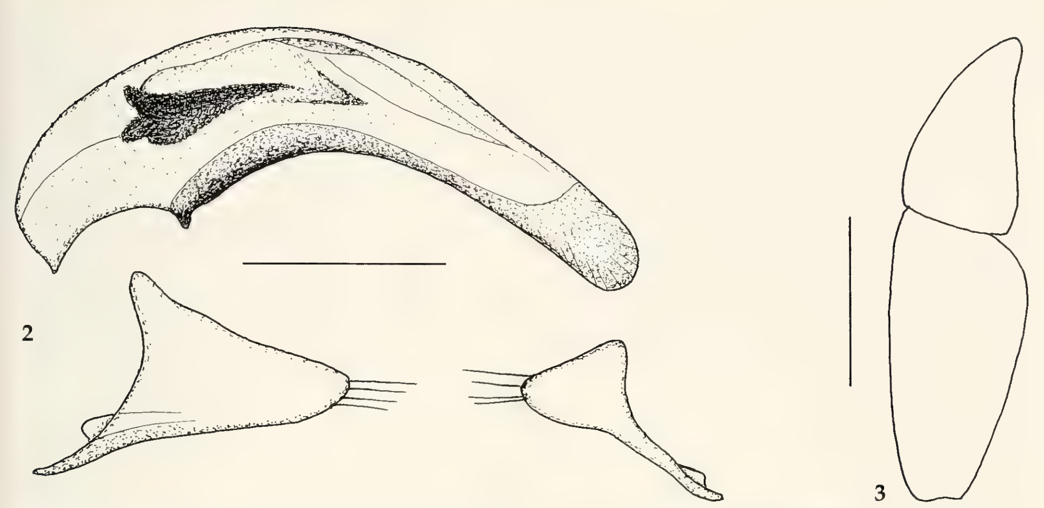
Extensive diagnoses of this genus are to be found in Andrewes (1923, 1935). Zamotajlov & Sciaky (1996) transferred the genus from Pogonini to Patrobini, though at the same time called in question, whether simple arrangement within Patrobinae conforms to the many special characteristics of the genus.

Lissopogonus borneensis, spec. nov.

Figs 1-3

Types. Holotype: ♂, BORNEO: SABAH, Bingkor N Keningau, 400-500 m, 19.-20.XI.1996, leg. W. Schawaller (SMNS). – Paratypes: 8♂♂, 10♀♀, same data (SMNS, CBM); 1♂, 4♀♀, BORNEO: SABAH, Bingkor N Keningau, 400-500 m, at light, 20.XI.1996, leg. D. Grimm (SMNS); 7♂♂, 5♀♀, BORNEO, BRUNEI, Temburong Kuala Belalong R. Borcherding leg./ 10.II., 11.II., 11.-16.3., 13.V., 29.V., VI-VII. 1995 (CBM, CWB); 2♂♂, 3♀♀, MALAYSIA – Sabah prov. Banjaran Crocker Mts. 15 km SW Gunung Alab 4-9.V.1996, alt. 790-850 m M. Strba & R. Hergovits leg. (CWB).

Diagnosis. Distinguished immediately from *L. glabellus* Andrewes and *L. poecilus* Andrewes by absence of any colour pattern on the elytra; from *L. tonkinensis* Zamotajlov & Sciaky by regularly convex elytra with much less distinct striation at apex; and from *L. suensoni* Kirschenhofer by longer elytra and less suddenly bent apex of aedeagus.



Figs 2, 3. *Lissopogonus borneensis*, spec. nov. ♂ and ♀ genitalia. **2.** Aedeagus from left, parameres. Scale: 0.25 mm. **3.** Stylomere 2 and base of stylomere 1. Scale: 0.1 mm.

Description

Measurements. Length: 4.6-5.1 mm; width: 1.9-2.05 mm. Ratios. Width/length of pronotum: 1.13-1.16; width base/apex of pronotum: 1.09-1.12; width pronotum/head: 1.08-1.12; length/ width of elytra: 1.42-1.47; width elytra/pronotum: 1.73-1.76.

Colouration. Black, sutural area of elytra more or less distincly dark reddish translucent. Mandibles, palpi, and antennae light brown, legs dark yellowish. Lower surface black or dark piceous.

Head. Slightly narrower than prothorax. Eyes comparatively large, laterally distinctly projecting, about 1.5 × as long as the oblique orbits. Clypeal suture superficially impressed. Frontal furrows slightly sinuate, laterally of furrow with a posteriorly widened field that is bounded on both sides by a carina. Neck constriction rather deep. Labrum transverse, anteriorly very gently excised, 6-setose. Mandibles moderately elongate, apically suddenly curved. Mentum with distinct, unidentate tooth. Antenna elongate, almost surpassing middle of elytra, median antennomeres >2 × as long as wide. Posterior supraorbital seta situated slightly behind posterior border of eye. Surface impunctate, without microreticulation, highly glossy.

Pronotum. Gently cordiform, slightly wider than long, in middle rather depressed, laterally evenly curved, basal angles rectangular. Widest diameter in anterior third. Base slightly wider than apex. Apex straight, apical angles feebly projecting, rounded off. Base very gently convex. Marginal channel narrow throughout, barely widened near basal angles, base and apex not margined. Median line deeply impressed, basally even deeper and wider. Base laterally with two punctiform impressions on either side. Basal grooves short, deep. Anterior marginal seta situated slightly in front of anterior third, posterior marginal seta slightly removed from basal angle. Surface impunctate, without any microreticulation, highly glossy.

Elytra. Moderately elongate, regularly curved, dorsally gently convex, widest at or slightly behind middle. Shoulders very obtusely dentate. Basal margin strong, sinuate, shortly interrupted near middle, connected to sutural stria. Scutellar striole and seta wanting. Only sutural stria distinct, impressed, impunctate. All other striae wanting on disk, or, in some specimens, finest traces of inner striae visible under high magnification. Short remnants of 2nd and 7th striae visible at apex. Marginal channel narrow throughout. A single setiferous puncture situated at position of 3rd interval, in middle. Marginal pores inconspicuous, about 12 in a row that is slightly interrupted in middle. Surface impunctate, without any traces of microreticulation, highly glossy. Inner wings present.

Lower surface. Impunctate. Metepisternum c. 1.5 × as long as wide. Sternum VII in ♂ bisetose, in ♀ quadrisetose.

Legs. Without striking features. Two basal tarsomeres of male anterior tarsus slightly expanded and squamose.

♂ genitalia. Aedeagus moderately elongate, rather strongly though regularly curved, apex wide, remarkably stout, slightly foliaceous. Internal sac rather simply folded, with several short sclerotized plates near base. Parameres dissimilar in size and shape, both 4-setose at apex.

♀ genitalia. Both stylomeres asetose, very similar to those of *L. tonkinensis* as figured in Zamotajlov & Sciaky (1996, fig. 110).

Variation. Rather little variation noted, though distinctness of elytral striae fairly variable.

Distribution. Sabah and Brunei, northeastern Borneo. The few records demonstrate that this species has a fairly wide distribution.

Collecting circumstances. Barely known, type series collected between 400 m and 850 m.

Etymology. The name refers to the range in northern Borneo.

Remarks. The newly detected species is evidence of a rather wide though still fragmentated distribution of the genus *Lissopogonus* in southern and eastern Asia. At present the range of the genus extends from northern India in the northwest to eastern China in the east, and to Java and Borneo in the south. Because all species apparently are mountain living, this range must have been achieved by some mountain hopping, which is highly probable because all five known species apparently are fully winged. However, no flying activities of any species have been thus far recorded. Generally, habits and life histories of all species are very inadequately known.

Any considerations about phylogenetic relations and zoogeographic history of this genus seem premature, as long as the actual status of this enigmatic group is not settled. Even when admitted that *Lissopogonus* is better arranged near Patrobinae than in Pogoninae, inclusion into Patrobinae is not really satisfactory and the erection of a distinct group of same taxonomic level as Patrobinae might better adjust the true relationships. However, in that case the relations of both, Patrobinae and the *Lissopogonus*-group, with Psydrinae *sensu latu* which probably are closely related to Patrobinae (see Baehr 1999) have to be settled, before any biogeograpical questions can be started.

Key to the species of the genus *Lissopogonus* Andrewes

1. Elytra with distinct colour pattern .... 2.
– Elytra without any colour pattern .... 3.

2. Prothorax little wider than long; elytra with a single puncture. Southern slopes of Himalaya .... *glabellus* Andrewes
– Prothorax almost a third wider than long; elytra with two punctures. Java ...... *poecilus* Andrewes

3. Elytra regularly convex, with indistinct striation at apex .... 4.
– Elytra reversely oviform, with rather distinct striation at apex. North Vietnam .... *tonkinensis* Zamotajlov & Sciaky

4. Elytra shorter and wider; apex of aedeagus narrower, aedeagus in apical third suddely turned down. Eastern China .... *suensoni* Kirschenhofer
– Elytra longer and narrower; apex of aedeagus wider, aedeagus more evenly curved, apex not suddenly turned down (Fig. 2). Northern Borneo .... *borneensis*, spec. nov.

Acknowledgements

My thanks are due to Dr. W. Schawaller (Stuttgart) and Mr. D. Wrase (Berlin) for the kind loan of the sample, to Mr. S. Hine (London) for the kind opportunity to study types of this genus, and to Mr. E. Kirschenhofer (Vienna) and Dr. R. Sciaky (Milano) for kind information on their recently described species.

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19. Platen, H.: Das Rattenbuch. Über die Allgegenwart unserer heimlichen Nachbarn. – Campus Verlag GmbH Frankfurt/Main, 1997. 262 S., zahlr. Abb. ISBN 3-593-35825-5.

Viele Menschen empfinden beim Anblick oder auch nur bei der Erwähnung von Ratten Abscheu und Ekel. Als Protagonist zahlreicher Grusel- und Horrorgeschichten werden ihr die abstoßendsten Eigenschaften nachgesagt. Ratten gelten aber auch – nicht zu Unrecht – als Überlebenskünstler, die sich trotz ausgefeilter Bekämpfungsmaßnahmen nicht aus unseren Städten verbannen lassen. Die Autorin kolportiert in ihrem unterhaltsam geschriebenen Buch allerlei Mythen und Volkssagen, aber auch zeitgenössische Filme und Romane, in denen die Ratte als Gruseltier und Inbegriff des Bösen und Unheimlichen dargestellt wird. Dabei werden die tiefenpsychologischen Hintergründe dieser Alptraumphantasien angesprochen, gleichzeitig wird aber auch der Versuch gemacht, den Überlebens- und Ausbreitungserfolg von *Rattus rattus* und *Rattus norvegicus* wissenschaftlich zu erklären. Manche unglaublich klingende Sensationsmeldung wird relativiert, gewisse physiologische Eigenschaften – zum Beispiel die angebliche Resistenz gegen gerinnungshemmende Gifte – ins rechte Licht gerückt. Ein ganzes Kapitel widmet sich der Geschichte der Pest, an deren Ausbreitung die Hausratte maßgeblich beteiligt war.

Trotz der vielen furchteinflößenden und unappetitlichen Geschichten über Ratten gewinnt man bei der Lektüre des Buches den Eindruck, daß die Autorin eigentlich eine Rattenfreundin ist. So kommt natürlich auch die Rolle der Ratte als Versuchs- und Labortier sowie als Heim- und Kuscheltier nicht zu kurz. Die biologischen Angaben zu Biologie, Physiologie und Verhalten darf man nicht allzu kritisch unter die Lupe nehmen, das meiste stammt aus der älteren Literatur und entspricht nicht mehr ganz dem neuesten Wissensstand. Es gelingt der Autorin jedoch sehr gut, zu zeigen, daß die Ratte seit Jahrhunderten die Phantasie der Menschen beschäftigt und wie kaum ein anderes Tier zur Reflexionsfläche für allerlei Ängste und zum Feindbild schlechthin wurde.

R. Kraft

20. Hellmann, F., E. Brockmann & (†) P. M. Kristal: I macrolepidotteri della Valle d'Aosta. – Monografie 2, Museo Regionale di Scienze Naturali Saint-Pierre, Valle d'Aosta, 1999. 284 S., 1 Farbtafel mit 10 Abb.

Die Autoren legen eine komplette Faunenliste aller Großschmetterlinge (im 'klassischen Sinne') des Aosta-Tales vor. Die in italienischer Sprache verfaßte Arbeit ragt mit 1141 nachgewiesenen Arten (!) unter den wenigen bisher vorliegenden Gesamtbearbeitungen italienischer Regionen in Umfang und Verläßlichkeit deutlich heraus. Für die Korrektheit der Determinationen – für Fauneninventare unerläßlich, wenn auch nicht selbstverständlich, wie uns andere Fällen leider lehren – bürgt der Fleiß der Autoren, die es zudem verstanden, eine Vielzahl von Spezialisten in die Entstehung dieser Faunenliste einzubeziehen. Sieben Arten sind neu für die italienische Fauna, ca. 60 neu für die Region Val d'Aosta.

Die einleitenden Kapitel behandeln Geographie, Geologie, Klima und Vegetation des Untersuchungsgebietes. Der Leser findet hier auch eine Liste der über 160 Fundorte mit Höhenangaben und genau nachvollziehbarer Lokalisierung.

Im Hauptteil wird jede Art nach folgenden Kriterien charakterisiert: Phänologie, oft Habitatangaben, Höhenverbreitung, relative Häufigkeit, detaillierte Verbreitungsdaten innerhalb des Untersuchungsgebietes. Interessant auch die durchwegs angewandte Einteilung in 'Corotypen' nach dem System von Vigna Taglianti. Auf einer schönen Farbtafel werden zwei endemische Hepialidenarten *(Pharmacis anselminae, Pharmacis claudiae)* und eine Lycaenidenart *(Polyommatus humedasae)* abgebildet.

Das Buch ist unglaublich gut recherchiert und korrekturgelesen, und abgesehen von einer Kleinigkeit – dem auf der Buchklappe verdruckten Autorennamen Kristall statt Kristal – gibt es hier nichts zu bemängeln. Wenn es nur mehr solcher Bearbeitungen gäbe!

A. Hausmann

SPIXIANA	**24**	2	171–175	München, 01. Juli 2001	ISSN 0341-8391

A new species of the genus *Minuthodes* Andrewes from North Queensland, Australia

(Insecta, Coleoptera, Carabidae, Lebiinae)

Martin Baehr

Baehr, M. (2001): A new species of the genus *Minuthodes* Andrewes from North Queensland, Australia (Insecta, Coleoptera, Carabidae, Lebiinae). – Spixiana **24/2:** 171-175

Minuthodes trimaculata, spec. nov. is described from the lower Cape York Peninsula, northern Queensland. The species is closely related to *M. froggatti* (Macleay) from North Queensland and far Northern Territory and *M. demarzi* Baehr from far Northern Territory. It is distinguished from both species by the different elytral pattern, presence of a light spot on frons of head, projecting though obtuse basal angles of pronotum, and scarcely rugose though distinctly microreticulate dorsal surface of the head. A checklist of the Australian species of the genus *Minuthodes* is added.

Dr. Martin Baehr, Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany.

Introduction

While working through unsorted and undetermined carabid material in the Coleoptera collection of the Queensland Museum, Brisbane (QMB), I detected a single specimen of the genus *Minuthodes* that at the first glance did not fit any Australian or New Guinean species of this genus known to me. After comparison with all related species in my working collection it proved to represent a new species that is, however, closely related to the northern Australian species *M. froggatti* (Macleay) and *M. demarzi* Baehr.

Because the catalogue of Moore et al. (1987) is outdated with respect to the genus *Minuthodes*, a checklist of all species recorded from Australia is added to this paper.

Measurements

Measurements have been made under a stereo microscope by use of an ocular micrometer. Length has been measured from apex of labrum to apex of elytra. Length of pronotum was taken along midline. Measurements, therefore, may slightly differ from that of other authors, especially Darlington.

Characters

During ample determinating work on Australian and New Guinean *Minothodes* it turned out that external characters like shape of pronotum, microstructure (puncturation, striation, microreticulation) of surface, and even the colour pattern on the elytra are of more value for the distinction of species than

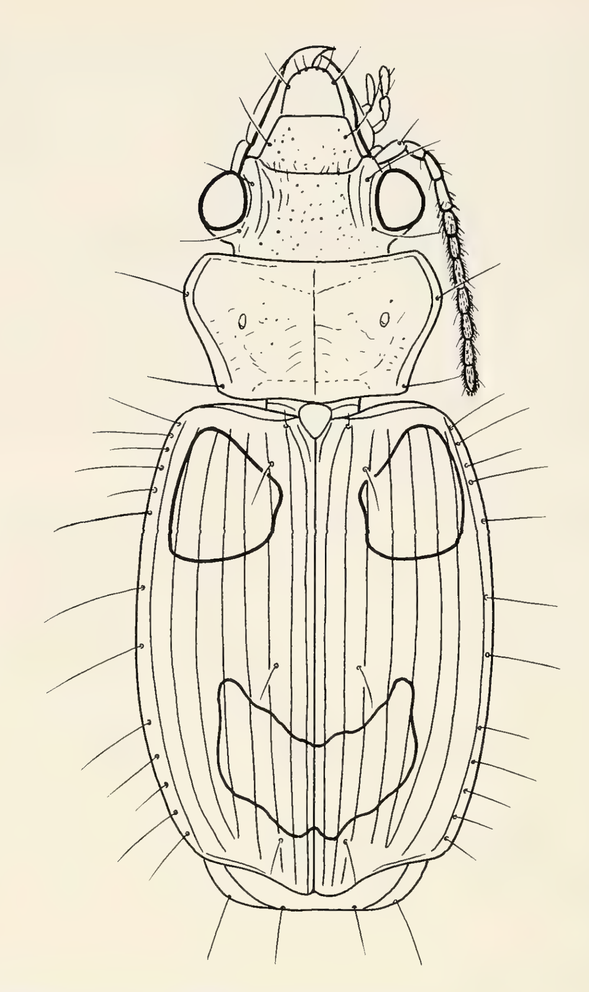


Fig. 1. *Minuthodes trimaculata*, spec. nov. Habitus. Length: 5.35 mm.

are the male genitalia. These are relatively uniform throughout the genus, while the mentioned external characters apparently are not only very distinct but also remarkably little variable within each species. Hence, discrimination of species is possible and even easier by use of external characters than male genitalia.

Minuthodes trimaculata, spec. nov.
Figs 1, 2

Types. Holotype: ♂, Musgrave 1.X.1974 G. B. Monteith (QMB, T 93151).

Diagnosis. Relatively large, trimaculate species with elytral pattern similar to *M. minima* (Macleay), but body much larger and wider. Distinguished from both most closely related species *M. froggatti* (Macleay) and *M. demarzi* Baehr by presence of a transverse reddish spot on frons, widely interrupted anterior and posterior elytral spots, less wide pronotum with projecting but distinctly obtuse basal angles, and but weakly rugose though markedly microreticulate upper surface of head. Further distinguished from *M. froggatti* (Macleay) by more heavily microreticulate and less glossy pronotum and elytra, and from *M. demarzi* Baehr by darkened femora, more cordiform pronotum, and far less rugose and therefore glossier surface of pronotum and elytra.

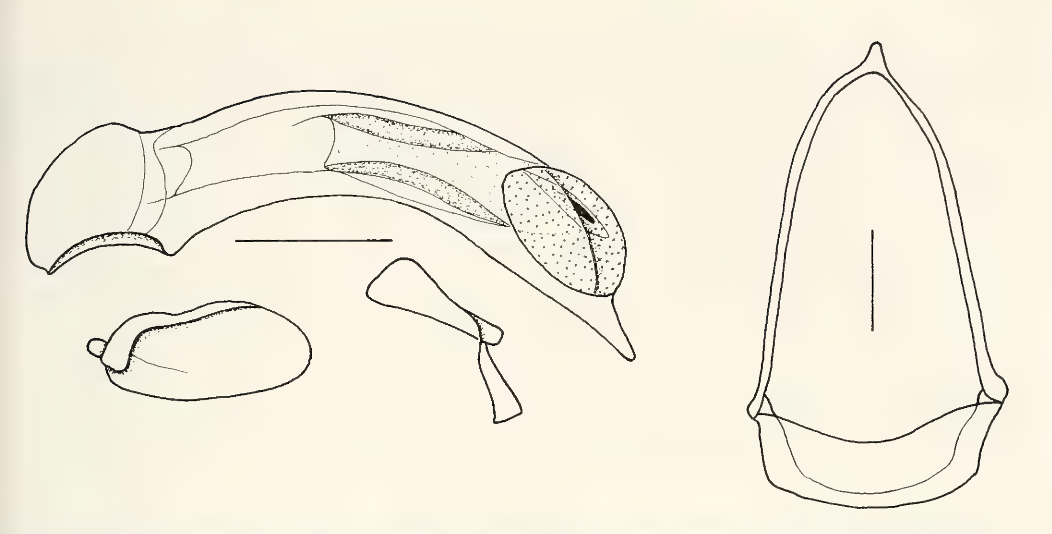


Fig. 2. *Minuthodes trimaculata*, spec. nov. Male genitalia: aedeagus, parameres, genital ring. Scales: 0.25 mm.

Description

Measurements. Length: 5.35 mm; width: 2.25 mm; ratio width/length of pronotum: 1.78; ratio width of pronotum/width of head: 1.15; ratio length/width of elytra: c. 1.45 (elytra somewhat opened).

Colour. Dark piceous-black. Frons posteriorly with two indistinct, transversely arranged, reddish spots. Elytra trimaculate, with a large, distinct, reddish, irregularly triangular humeral spot that extends from 3rd stria to 7th stria though is not in contact to any part of the anterior or lateral margins. In apical half with a common crescent-shaped, reddish spot that laterally extends to 6th stria and is anteriorly prolonged at position of 4th stria. Both, the humeral spots and the apical spot very widely separated. Lateral margins of pronotum and elytra narrowly reddish. Palpi and antenna reddish throughout, three basal antennomeres very faintly lighter than the rest. Femora piceous, tibiae and tarsi dark reddish, moderately contrasting. Lower surface of pronotum and abdomen laterally piceous, in middle broadly reddish. Elytral epipleurae anteriorly reddish.

Head. Wide in comparison to prothorax. Frons anteriorly in middle feebly convex, laterally with very shallow impressions. Impressions with about four to five inconspicuous and rather irregular longitudinal furrows, in middle with some inconspicuous wrinkles. Base of clypeus also with some short longitudinal wrinkles. Eyes large, markedly protruding, with small, obliquely convex orbits. Head but little narrower than prothorax. Clypeo-frontal suture distinct. Anterior margin of clypeus slightly excised, anterior angles broadly rounded, bisetose. Labrum elongate, considerably longer than wide, lateral borders oblique, apex straight, behind apex in middle with a small circular groove. Labrum 6-setose, the proximal seta far removed from apical margin, lateral margins apparently without additional hairs. Mandibles with some longitudinal furrows on upper surface. Terminal palpomere of labial palpus as long as penultimate palpomere, apparently impilose. Maxillary palpus with sparse and very fine pilosity. Mentum with sharp, unidentate tooth. Submentum bisetose, gula quadrisetose. Antenna short, barely surpassing basal angle of pronotum, median antennomeres but slightly longer than wide, densely pilose from apex of 4th antennomere, basal antennomeres sparsely setose. Microreticulation distinct on whole surface including clypeus and labrum, isodiametric. Frons and clypeus irregularly punctate, surface rather dull, apparently without any pilosity.

Pronotum. Wide, distinctly cordiform. Apex slightly wider than base, feebly concave, anterior angles broadly rounded. Sides almost evenly rounded though with a very obtuse angle at position of anterior marginal seta, widest in anterior third. Near basal angle with comparatively elongate sinuosity. Basal angles projecting though obtuse, because the basal margin is considerably curved at angle. Base in middle gently convex. Base bordered throughout, apex in middle unbordered. Lateral channel rather narrow throughout, margin slightly upturned. Disk in middle somewhat raised. Median line distinct, in middle deeply impressed. Basal grooves fairly deep, oblique, prebasal transverse sulcus distinct. Between median line and lateral margin in middle with a small, circular, moderately deep

groove. Anterior marginal seta situated in anterior third, at widest diameter of pronotum, posterior marginal seta situated at basal angle. Microreticulation im middle slightly superficial, irregularly transverse, near borders distinct, isodiametric. Puncturation irregular, rather sparse on disk, laterally and apically coarse and denser. Surface with many shallow, irregularly transverse wrinkles, on disk moderately glossy, laterally more dull, with moderately dense, short, declined, yellow pilosity.

Elytra. Moderately short and wide, widest behind middle, depressed. Humeri evenly rounded, sides very feebly convex, apex oblique, deeply sinuate, sutural angles broadly rounded, elytra slightly dehiscent at suture. Marginal channel slightly widened at anterior third. Striae distinct though shallow, microreticulation distinct, isodiametric, the whole surface densely punctate and pilose. Pilosity yellow, rather short, somewhat declined. 3rd interval with three discal punctures, the anterior one situated near base at position of 3rd stria, both posterior punctures situated near 2nd stria, 3rd puncture very close to apex. Punctures and the very short setae arising from the punctures difficult to trace within the dense puncturation and pilosity. Marginal setae very elongate. Lateral margin extremely finely serrate and very sparsely pilose in anterior half. Surface rather opaque. Posterior wings fully developed.

Lower surface. Proepisternum impilose, prosternum sparsely pilose. Lower surface of hind body rather sparsely punctate and pilose. Metepisternum almost 2 × as long as wide at apex. Terminal abdominal sternum of male 4-setose.

Legs. Four basal tarsomeres of male protarsus slightly widened and biseriately squamose, though 4th tarsomere with few squamae only.

Male genitalia. Genital ring elongate, almost symmetric. Basal plate transversely split. Aedeagus narrow, elongate, fairly curved, lower surface evenly concave, apex straight, elongate. Orificium short, turned to left side. Internal sac very simply folded, with a small tooth-like sclerite inside orificium. Parameres very dissimilar, right paramere fairly small, apically widened, left paramere larger.

Female genitalia. Unknown.

Variation. Unknown.

Distribution. Lower Cape York Peninsula, northern Queensland. Known only from type locality.

Collecting circumstances. Not recorded. Holotype captured in October.

Etymology. The name refers to the trimaculate elytral pattern.

Remarks

The genus *Minuthodes* Andrewes is most speciose and diverse in New Guinea (Darlington 1968, Baehr 1998), whereas for a long time in Australia only a single species was known that occurs in northern Queensland (Moore et al. 1987). During the last decade, however, additional species were described from north Queensland as well as from the northern parts of Northern Territory and from northwestern Australia (Baehr 1990, 1994). At the same time, some species previously included in the genus *Agonocheila* Chaudoir by Moore et al. (1987) were arranged in the genus *Minuthodes* by Baehr (1990). Hence, at present, in Australia the genus *Minuthodes* is distributed from eastern South Australia through Victoria, the Australian Capital Territory, New South Wales, central and eastern Queensland, far Northern Territory, and to the Kimberley Division in northwestern Australia as far south as Fitzroy Crossing. For distribution of the involved species see checklist at the end of this paper.

Contrary to New Guinea, in Australia the genus *Minuthodes* includes a group of very small species (*M. minima* Macleay, *M. serrata* Baehr) that live under bark of eucalypts in open rather than closed forest. Almost all species of the major group of large, wide species in New Guinea occur – as far as their habits are recorded – in rain forest where they live on the bark of standing trees as well as on logs, sometimes even in the thick cover of moss on tree trunks. In Australia, *M. queenslandica* Sloane and *M. walfordi* Baehr belong to this group and may possess the same habits. *M. froggatti*, however, which likewise belongs to the group of large species, in northern Queensland and in far Northern Territory has been found by me mainly under bark of eucalypts, e.g. River Gums *(Eucalyptus camaldulensis)*, where it lives in a similar way as the small subcortical species mentioned above. No collecting circumstances are known of *M. demarzi* Baehr and the new species described herein. From the collecting localities, however, I would argue that they likewise live rather under eucalypt bark in open sclerophyll forest and tropical savannah than in rain forest.

In Australia at least, subcorticolous species of open sclerophyll forests and rain forest species of *Minuthodes* differ in their elytral pattern. Whereas both rain forest inhabiting species *M. queenslandica* Sloane and *M. walfordi* Baehr possess a pattern consisting of many narrow, light stripes, all sclerophyll forest inhabiting species possess a bilineate, trimaculate, or quadrimaculate pattern, very similar to those patterns common in subcorticolous sclerophyll forest living species of other carabid genera. It seems, hence, that elytral patterns consisting of large spots are better adapted to the conditions in sclerophyll forests, wheres the multilineate patterns apparently are better adapted to rain forest conditions. The reasons for this are still unknown, but it may be caused by different predatorial constraints.

It follows, then, that in Australia several species of *Minuthodes* apparently have managed to change their habits of living in rain forest to invade the open sclerophyll forests. As the stock of the genus *Minuthodes* certainly was a rather recent immigrant into northern Australia from the north, the genus represents one of the rare examples of rain forest inhabiting Oriental or Papuan faunal elements that have successfully invaded the unique Australian habitat of subcortical fissures on eucalypts in open sclerophyll forests and tropical savannahs. Because this habitat houses a numerous and diverse subcortical carabid fauna, it would be very interesting to know the way in which certain *Minuthodes* species managed to introduce themselves into the new habitat and to escape from competition of the many species of Psydrinae *(Amblytelus, Dystrichothorax)*, Tetragonoderinae *(Scarothrocrepis)*, Lebiinae *(Agonocheila, Philophloeus, Demetrida, Trigonothops, Phloeocarabus)*, and Pseudomorphinae *(Adelotopus, Sphallomorpha)* that likewise occur under eucalypt bark and actually may be found on the same tree.

Checklist of the species of *Minuthodes* from Australia

For the benifit of the reader this checklist includes some information about the recorded range of the species. It was compiled from the literature and from my own collecting and determinating experience (abbreviations of the states of Australia as usual, e: eastern, n: northern).

demarzi Baehr, 1990	n.NT
froggatti (Macleay, 1888)	ne.QLD, n.NT, n.WA
minima (Macleay, 1864)	e.SA, VIC, ACT, NSW, QLD
queenslandica (Sloane, 1917)	ne.QLD
serrata Baehr, 1990	n.NT, n.WA
trimaculata, spec. nov.	ne.QLD
walfordi Baehr, 1994	ne.QLD

Acknowledgements

My sincere thanks are due to Dr. G. B. Monteith, Queensland Museum, Brisbane, for the kind loan of the material.

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-- Baehr, M. 1998. Two new species of *Minuthodes* Andrewes from New Guinea (Insecta, Coleoptera, Carabidae, Lebiinae). – Spixiana **21**: 235-240

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Buchbesprechungen

21. Hürter, H.-A.: Die wissenschaftlichen Schmetterlingsnamen, Herleitung und Deutung. – Verlag Peter Pomp, Bottrop, Essen, 1998. 482 S. ISBN 3-89355-176-X.

Der Autor legt dem Leser ein ungewönliches, innovatives Nachschlagewerk vor, das – wie kein anderes zuvor in der Lepidopterologie – die altphilologischen Wurzeln von Schmetterlingsnamen analysiert. Als Zielgruppe wurden die in den "Schmetterlingen Mitteleuropas" (Forster & Wohlfahrt 1976) genannten Tagfalternamen gewählt, insgesamt 643 Art- und Gattungsnamen sowie deren wichstigste Synonyme. Da auch bei den Nachtfaltern oft ähnliche bzw. gleiche Namen auftauchen, kann deren Bedeutung in so manchem Falle auch in diesem, auf die Tagfalter beschränkten Werk nachgeschlagen werden.

Durchgehend stellt der Autor mehrere Erklärungsversuche nebeneinander, um dann deren Plausibilität in eingehender Diskussion gegeneinander abzuwägen. Eine Fülle von Fußnoten ergänzt diese Analyse in fundierter Weise.

Die mit Forster & Wohlfahrt (1976) übereinstimmende Nummerierung macht das Werk besonders benutzerfreundlich.

Da durch die detaillierten Erklärungen tief in Themenbereiche der Geschichte und der antiken Sagenwelt ("Liebesgeschichten, Eifersuchtsdramen, Tiergeschichten, Zauberei, Alkoholgeschichten, Bestechung, Mißverständnis mit Todesfolge, Kindesaussetzung, Kannibalismus, Raubmord, politischer Machtkampf") eingegangen wird, ist das Buch in vielen Passagen nicht nur sehr informativ, sondern regt durchaus auch zum Schmunzeln an.

Fazit: Ein jedem Lepidopterologen, aber auch jedem humanistisch bzw. altphilologisch Interessierten sehr zu empfehlendes Werk, das so detailliert auf alle Einzelheiten eingeht, daß bei der Lektüre weder geschichtliches Vorwissen noch Latein- oder Griechisch-Kenntnisse vonnöten sind.

A. Hausmann

22. Baez, M.: Mariposas de Canarias. – Editorial Rueda S.l., Madrid, 1998. 216 S., 323 Farbfotos. ISBN 84-7207-1100-3.

Auf 323 durchwegs guten und hervorragend zur Bestimmung geeigneten Farbfotos wird in diesem neuen Führer mehr als die Hälfte der derzeit von den Kanarischen Inseln bekannten Schmetterlingsarten vorgestellt. Angenehmerweise behandelt dieses Buch auch die Microlepidoptera ausführlich, so daß man einen ausgewogenen Überblick über die Fauna dieser Inselgruppe bekommt.

Obwohl die kanarischen Inseln wegen deren Beliebtheit als Urlaubsziel (und der damit verbundenen Annehmlichkeiten bei Planung und Durchführung der Reise) schon unzählige Male von Schmetterlingssammlern besucht wurden, so gab es bisher praktisch keine Übersicht über das Fauneninventar, da die publizierten Daten (v.a. von Klimesch, Rebel und Pinker) in einer großen Zahl von Einzelartikeln in Fachzeitschriften veröffentlicht wurden.

Der Autor ist ein bekannter Lepidopterologe, der vor Ort an der Universität La Laguna auf Teneriffa beschäftigt ist. Er stellt dem Buch eine bebilderte, instruktive Übersicht über die verschiedenen Familien voran und läßt darauf den systematischen Teil folgen. In diesem wird jede Art mit einem Farbfoto und einem halbseitigen, spanischen Text vorgestellt, der im Wesentlichen aus einer Kurzbeschreibung, einer Charakteristik der Verbreitung sowie Habitat- und Futterpflanzenangaben besteht.

Den Abschluß des Werkes bilden eine sytematische Liste aller (nicht nur der speziell behandelten!) Arten, ein Index der Schmetterlingsarten und ein Index der Raupenfutterpflanzen.

Diese wertvolle Neuerscheinung ist Pflichtlektüre im Gepäck jedes Entomologen, der die Kanarischen Inseln bereist, und darüber hinaus ein solides Bestimmungswerk für jeden Naturfreund!

A. Hausmann

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Two new sibling species of *Mantidactylus cornutus* from Madagascar

(Amphibia, Anura, Ranidae)

Frank Glaw & Miguel Vences

Glaw, F. & M. Vences (2001): Two new sibling species of *Mantidactylus cornutus* from Madagascar (Amphibia, Anura, Ranidae). – Spixiana **24/2:** 177-190

A review of the Malagasy frogs which in the past were subsumed under the name *Mantidactylus redimitus,* together with new field data, led to the confirmation of the specific validity of *M. cornutus* and to the recognition of two new species: *M. tschenki,* spec. nov. from Ranomafana is morphologically similar to *M. cornutus* but shows distinct differences in advertisement call and has a slightly bilobed (instead of a roundish) subgular vocal sac. *M. tandroka,* spec. nov. from higher elevations of the Marojezy massif is distinguished by a wide head, distinct dorsal ridges, and colouration from *M. cornutus, M. tschenki,* and *M. redimitus.* The discovery of close syntopy of *M. redimitus* and *M. cornutus* in central eastern Madagascar confirms that they represent valid species and that advertisement calls are good indicators for specific distinctness in Malagasy anurans.

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Introduction

During the last decades it has become evident that the analysis of advertisement calls is crucial to understand the species diversity of anurans (e.g. Passmore & Carruthers 1995). This is especially true for tropical anuran communities like those in Madagascar which are poorly studied and where numerous new amphibian species are still to be discovered and described. A significant percentage of the recently discovered new species are morphologically similar to already known species and some of those sibling species pairs are hardly distinguishable when preserved (Glaw & Vences 2000). However, in all cases in which anurans with relevant differences in their advertisement calls have been investigated genetically, relevant genetic distances – indicative of reproductive isolation at the species level – have been found (pers. obs. in more than 20 species pairs from Madagascar, South America, and Asia).

In the present paper we review a complex of species in the Malagasy genus *Mantidactylus* which previously (Guibé 1978, Blommers-Schlösser & Blanc 1991) were all subsumed under the name *Mantidactylus redimitus.* Glaw & Vences (1992b) noted the bioacoustic and morphological differences of low-altitude *M. redimitus* specimens and those of mid-altitude localities, and described the latter as new species *M. cornutus.* We here provide evidence that *M. cornutus* populations as listed in the distribution map of Glaw & Vences (1994) are still composed of various species: one new sibling species was discovered during a bioacoustic survey near the village Ranomafana in south-eastern Madagascar; its morphology is very similar to *M. cornutus* but its advertisement calls are rather different. In contrast, specimens from the Marojezy massif in north-eastern Madagascar differ by distinct morphological features and are described as second new species, although their advertisement calls are not yet known.

Materials and methods

Vocalizations were recorded using portable tape recorders with an external microphone (Vivanco EM 238) and were analyzed with the MEDAV sound analyzing system Spektro 3.2. The following morphological measurements were taken with a calliper to the nearest 0.1 millimeter: SVL (snout-vent length), HW (head width), HL (head length), ED (horizontal eye diameter), END (eye-nostril distance), NSD (nostril-snout tip distance), NND (nostril-nostril-distance), TD (horizontal tympanum diameter), HAL (hand length), FORL (forelimb length), HIL (hindlimb length), FOL (foot length), FOTL (foot length including tarsus), IMTL, IMTH (length and height of inner metatarsal tubercle), T1L (length of first toe). Webbing formula is given according to Blommers-Schlösser (1979). Institutional abbreviations are as follows: BM (Natural History Museum, London); MNHN (Muséum national d'Histoire naturelle, Paris); MRSN (Museo Regionale di Scienze Naturali, Torino); ZFMK (Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn); ZSM (Zoologische Staatssammlung, München). Statistical analyses were carried out using SPSS for Windows, version 9. We performed Mann-Whitney U-tests to test significance of intersexual differences in size and morphometric ratios (relative tympanum length, ratio TD/SVL; relative size of inner metatarsal tubercle, IMTL/SVL and IMTH/SVL). Temporal and metric measurements are given as range, with mean ± standard deviation in parentheses.

Results

Mantidactylus redimitus (Boulenger, 1889)

Material examined. BM 1947.2.26.55 (holotype; original number BM 89.8.1.24; Madagascar); BM 92.3.7.39-41 (Sahembendrana); BM 1928.5.9.11-12 (Brickaville); BM 1988.593 (Ambatovaky); MNHN 1973.911 (Marojezy, 600-1300 m altitude); MNHN 1973.937 (Marojezy, 300 m altitude); MNHN 1973.938-939, 1973.941 (Marojezy, 600 m altitude); ZFMK 52704-52705 (Nosy Boraha); ZFMK 52716 (Nosy Mangabe, juv.); ZFMK 60073 (An'Ala).

Morphology. Summarizing measurements of the specimens in Table 1 (only adults considered; type not included due to bad state of preservation) results in a male SVL of 43.4-52.8 mm (47.6 ± 3.7 mm, n = 6) and a female SVL of 48.1-48.3 mm (n = 2). Mean male SVL was 99 % of mean female SVL. Sexual size dimorphism was not significant (U-test, $P = 1$). All specimens corresponded to the description in Glaw & Vences (1994) in having short legs (tibiotarsal articulation reaching at least to the anterior eye corner, at most between nostril and snout tip), and a rather smooth dorsal skin, without large dermal spines on the eyes, and with a pair of only faintly expressed tubercles between the eyes. Mean relative tympanum size did not differ significantly between sexes (U-test, $P > 0.6$), while intersexual differences in relative length and height of inner metatarsal tubercle (means of both values larger in males) were close to significance (U-test, $P = 0.07$). In contrast to the following species, the femoral glands in male *M. redimitus* were prominent and always well visible. Their size was 9.7 × 2.9 mm in MNHN 1973.911, 8.6 × 2.9 mm in MNHN 1973.937, 7.8 × 3.0 mm in ZFMK 52704, 8.4 × 3.3 mm in ZFMK 52705, and 9.2 × 3.1 mm in ZFMK 60073.

Habitat and habits. Calling activity generally started at dusk, but sometimes single calls were also heard since the early afternoon (14.30 h). Calling males were found in February and March sitting horizontally in the vegetation (1-2 m above the bottom) along larger brooks (broader than 1 m). At An'Ala, where *M. redimitus* was observed calling syntopically with *M. cornutus*, the former was only found at the edge of a broad brook (> 3 m) whereas the latter was sitting along a small afflux (not broader than 0.5 m) only several metres apart. W. Herwig (pers. comm.) photographed a specimen of *M. redimitus* at Vohidrazana on 16 July 2000 at 19.30 h. It was sitting on a leaf of a bush about 160 cm above the bottom. This record indicates that *M. redimitus* is also active in the comparatively cold and dry winter season.

Advertisement calls. Calls were recorded at An'Ala (on 11 February 1995, 17.30 h, at 22 °C air temperature) and Marojezy (on 22 February 1995, ca. 21.00 h, at 25 °C air temperature). They consisted either of single notes or note series. Each note (Fig. 1) corresponded to one expiration. At An'Ala, note duration was 274-352 ms (309 ± 22 ms, n = 9), duration of intervals between notes was 484-717 ms (584 ± 75 ms, n = 8). Each note was composed of 4-6 pulse groups, each of which contained 2-7 pulses. The longest note series recorded consisted of 12 notes and had a note repetition rate of 1.1 / s. Frequency was 900-1400 Hz. At Marojezy, note duration was 315-350 ms (329 ± 10 ms, n = 9), duration of intervals between notes 493-737 ms (597 ± 106 ms, n = 6). Each note consisted of 7-10 pulse groups, each of which

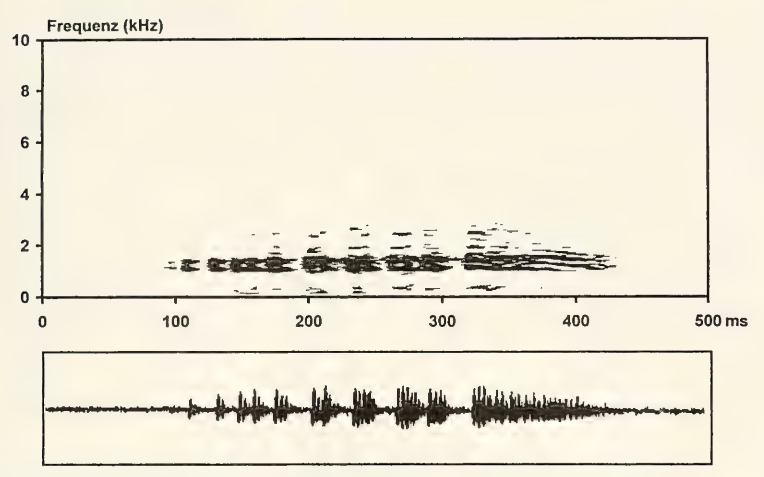


Fig. 1. Sonagram and oscillogram of one note of *Mantidactylus redimitus* from Marojezy.

contained 1-10 rather indistinct pulses. Frequency was 900-1500 Hz.

Further recordings from Nosy Boraha were analyzed by Glaw & Vences (1992a,b). The high note repetition rate (up to 2.5/s) in these recordings differ from the An'Ala and Marojezy data, and may be due to an exceptional motivation of the corresponding specimen (several specimens were calling rather close to each other). The low note duration (ca. 100 ms) as given by Glaw & Vences (1992b), however, is an artefact of analysis (probably originated by measuring note duration on the sonagram), the actual note duration in the Nosy Boraha recordings was similar to that in An'Ala and Marojezy as we ascertained by re-analysis.

Distribution. Data presented here confirm that *M. redimitus* is primarily a low-altitude species. At Marojezy, it has mainly been found at 300-600 m above sea level, only one specimen comes from an imprecise higher altitude (600-1300 m). The collecting localities at Nosy Boraha and Nosy Mangabe were close to sea level (< 100 m altitude), whereas that of An'Ala was at 840 m above sea level. Sahembendrana is also at mid-altitude, while Ambatovaky and Brickaville can be considered as low-altitude sites. Beside these localities, Glaw & Vences (1994) list one additional locality, Maroantsetra-Antalaha (that means the path between both cities), which is based on personal observations in 1987 (only photographic voucher available). A further photographic record was made by W. Herwig at Vohidrazana some 700 m above sea level.

Raxworthy & Nussbaum (1996) reported *M. redimitus* [*M. redimitis* (sic!)] from altitudes of 650-1700 m in the Andringitra massif but did not list *M. cornutus*. Since *cornutus*-like specimens are known from Andringitra (see below), it is possible that this record is based on a misidentification. The same regards their record of *M. redimitus* from Ranomafana (900-1050 m altitude) which possibly refers to the new species *M. tschenki* described below. Two additional records of *M. redimitus* exists for the "Réserve Spéciale du Pic d'Ivohibe" (1200 m altitude) and the corridor to the "Parc National d'Andringitra", 900 m altitude (Raselimanana 1999). Since *M. cornutus* is not mentioned in this paper and MNHN material from Pic d'Ivohibe is *cornutus*-like these records are also likely to refer to *M. cornutus* or *M. tschenki*.

Mantidactylus cornutus Glaw & Vences, 1992

Material examined. ZFMK 52702-52703 (paratypes, Andasibe); ZFMK 53691 (holotype, Andasibe); ZFMK 59867 (Andasibe); ZSM 573/1999 (paratype, Andasibe, originally ZFMK 53690); ZSM 308/2000 (Vohidrazana, 18°57' 57" S, 48°30' 37" E, 730 m above sea level).

Notes on the type material. In the original description of *M. cornutus* (Glaw & Vences 1992b: 272) the paratypes were defined as follows: "Three adult males (ZFMK 53690, 52702, 52702) from Andasibe ...". The latter number was a typing error and must be corrected to 52703.

Tab. 1. Morphometric measurements (all in mm) of specimens of *Mantidactylus redimitus, M. cornutus, M. tschenki,* and *M. tandroka.* For abbreviations of measured variables, see Materials and Methods; further abbreviations used: M, male; F, female; SA, subadult; HT, holotype; PT, paratype; TT, point reached by tibiotarsal articulation when adpressed along the body: 0, anterior eye margin; 1, between eye and nostril; 2, nostril; 3, between nostril and snout tip; 4, snout tip; 5, beyond snout tip; 6, widely beyond snout tip.

Catalogue Nr.	Sex	SVL	HW	HL	TD	ED	END	NSD	NND	FORL	HAL	HIL	FOTL	FOL	IMTL	IMTH	TL1	TT
M. redimitus																		
BM 1947.2.26.55 (HT)	M	47.4	15.6	18.0	2.6	4.9	5.5	2.9	4.4	28.5	13.7	73.1	33.1	22.4	2.2	1.6	3.7	0
MNHN 1973.911	M	50.5	17.0	19.3	3.1	5.4	6.1	2.6	4.0	29.8	15.2	80.6	39.4	26.4	2.9	2.3	5.5	0
MNHN 1973.937	M	52.8	17.7	20.3	3.3	5.7	6.1	2.7	4.3	32.7	15.7	83.8	39.7	27.3	2.8	2.1	5.3	0
MNHN 1973.938	F	48.3	15.8	18.7	2.8	5.8	5.5	2.5	4.0	29.6	15.1	88.4	39.2	25.0	2.0	1.1	4.8	2
MNHN 1973.939	M	48.4	15.6	18.0	2.7	5.3	5.2	3.2	4.4	30.4	14.9	81.4	37.9	26.0	2.7	2.0	5.2	1
MNHN 1973.941	F	48.1	15.8	18.8	2.6	6.0	5.6	2.7	3.7	29.0	14.7	86.8	38.2	25.5	2.2	1.2	5.6	1
ZFMK 52704	M	44.0	15.7	17.6	2.6	4.5	5.4	3.0	4.4	26.5	12.2	67.0	31.0	20.7	2.2	1.6	3.2	1
ZFMK 52705	M	43.4	15.0	19.0	2.5	5.5	5.2	2.2	4.1	27.7	13.3	70.9	32.1	22.0	2.0	1.7	3.5	1
ZFMK 60073	M	46.6	15.7	18.0	2.5	5.5	6.0	3.0	4.1	29.2	14.2	78.2	34.2	24.0	2.8	1.9	4.3	3
M. cornutus																		
ZFMK 52702 (PT)	M	37.5	12.8	14.5	2.1	4.6	4.1	2.2	3.2	23.9	11.8	70.2	30.2	20.1	1.7	1.6	3.7	5
ZFMK 52703 (PT)	M	39.4	12.7	15.0	2.0	4.5	5.0	1.9	3.5	24.7	12.0	67.7	29.8	19.4	1.6	1.4	3.6	3
ZFMK 53691 (HT)	M	39.7	12.4	14.7	2.0	4.7	4.1	2.2	3.7	23.7	11.2	67.7	29.3	20.0	1.9	1.7	3.7	5
ZFMK 59867	F	38.9	12.3	14.7	2.5	4.7	4.0	2.2	3.6	24.9	11.6	73.2	31.2	20.3	1.4	0.9	3.8	6
ZSM 573/1999 (PT)	M	40.1	13.2	15.7	2.3	4.2	4.8	2.2	3.5	24.6	12.6	69.5	30.8	21.0	1.6	1.5	3.4	5
ZSM 308/2000	F	33.3	11.0	13.4	2.3	4.1	4.0	2.1	2.8	23.2	10.3	72	32.2	20.3	1.3	0.5	3.3	6
M. tschenki																		
MRSN A379 (PT)	M	34.7	11.0	13.0	2.1	4.0	3.7	1.7	2.9	21.6	10.4	58.1	26.1	18	2.2	1.1	–	1
ZFMK 62296 (PT)	M	36.2	12.6	14.0	2.1	4.3	3.9	2.0	3.2	26.0	12.0	67.0	29.0	20.0	2.0	1.4	3.3	6
ZFMK 62297 (PT)	M	34.8	12.2	14.0	2.2	4.5	4.2	2.0	2.8	23.7	10.7	63.5	29.2	19.4	2.0	1.5	3.2	6
ZSM 936/2000 (HT)	M	36.1	12.0	13.6	2.0	4.6	3.9	2.2	3.2	24.8	11.6	67.0	29.4	20	2.0	1.3	3.4	6
M. tandroka																		
MNHN 1973.912 (PT)	F	43.2	14.9	16.4	2.9	5.1	4.1	2.5	4.6	29.2	13.9	81.8	36.2	24.2	1.3	0.9	4.4	6
MNHN 1973.922 (PT)	M	38.9	13.1	14.5	2.2	4.8	3.4	2.2	3.7	26.6	13.0	74.4	32.8	21.8	1.8	1.3	4.6	5
MNHN 1973.924 (HT)	M	38.7	13.2	14.6	2.4	4.8	3.5	1.9	3.9	26.0	12.7	70.2	32.9	21.9	1.8	1.5	4.4	5
MNHN 1973.926 (PT)	F	44.7	15.3	16.7	2.8	5.4	4.4	2.5	4.2	28.8	14.5	84.1	37.6	24.5	1.5	0.8	4.8	5
MNHN 1973.927 (PT)	M	38.8	14.0	15.6	2.4	5.1	3.8	2.3	3.5	26.3	12.7	73.3	32.8	21.9	1.9	1.4	4.5	5
MNHN 1973.928 (PT)	F	39.8	13.3	14.8	2.2	5.1	3.8	2.3	3.8	25.8	12.6	78.4	34.3	22.4	1.2	1.1	5.1	6
MNHN 1973.929 (PT)	M	38.8	13.1	15.0	2.4	5.2	3.8	2.4	4.1	23.3	12.5	73.5	31.7	22.1	1.8	1.7	4.5	5
MNHN 1973.930 (PT)	SA	33.9	11.6	13.0	2.4	4.3	3.4	1.9	3.6	23.8	11.1	72.3	32.3	20.0	1.2	0.6	4.6	6
ZFMK 59894 (PT)	F	39.6	15.0	16.5	2.3	5.4	4.3	2.7	4.7	27.0	13.6	80.1	36.0	23.1	1.2	0.7	4.6	6
ZSM 937/2000 (PT)	F	41.5	15.3	16.6	2.3	5.6	4.3	2.6	4.3	28.3	14.0	85.0	38.1	24.3	1.8	0.9	4.1	6
Determination uncertain																		
MNHN 1953.74	F	37.9	11.8	14.0	2.4	4.7	4.0	2.7	3.4	25.9	13.3	76.1	33.6	21.3	1.3	0.6	3.7	5
MNHN 1991.2940	F	42.6	13.5	16.0	2.4	5.3	4.7	2.3	3.2	24.8	12.8	74.4	33.4	20.5	1.3	0.6	4.0	4
MNHN 1991.2941	M	38.8	12.3	13.9	2.1	4.7	4.1	1.8	3.6	25.5	13.0	66.3	28.6	19.4	2.2	1.6	3.2	5
MNHN 1972.571	F	39.4	12.3	14.8	1.8	4.1	4.1	2.2	3.4	–	12.9	71.5	31.6	21.8	1.3	0.6	4.0	5
MNHN 1972.572	F	35.9	12.0	14.6	2.0	3.3	4.4	2.3	3.2	–	11.6	68.2	30.9	21.0	0.9	0.4	4.3	5
MNHN 1972.1471	M	39.5	12.4	15.2	2.6	4.5	3.9	2.1	3.1	25.4	12.0	68.1	29.2	20.0	2.1	1.6	3.6	5
MNHN 1972.1472	M	41.4	13.2	16.2	2.2	4.9	4.5	2.1	3.2	24.0	11.9	68.8	29.9	20.7	1.7	1.6	4.3	2
ZFMK 50593 (PT *cornutus*)	F	40.7	13.0	14.9	2.5	4.4	4.4	2.0	3.3	24.7	12.9	74.7	33.9	22.0	1.5	0.8	3.3	6

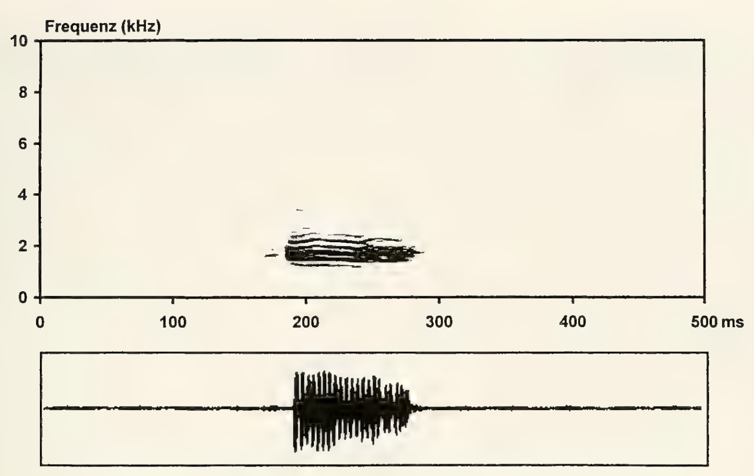


Fig. 2. Sonagram and oscillogram of one note of *Mantidactylus cornutus* from An'Ala.

Morphology. In the studied sample (see Table 1 for measurements), SVL was 37.5-40.1 mm (39.2 ± 1.2 mm, n = 4) in males and 33.3-48.9 mm (36.1 ± 4.0 mm, n = 2) in females. Mean male size was 109 % of mean female size, no significant sexual size dimorphism was found (U-test, P > 0.2). All specimens largely corresponded to the descriptions of Glaw & Vences (1992b, 1994) in having rather long legs (tibiotarsal articulation reaching at least nostril, mostly beyond snout tip) and a distinct pair of blackish tubercles between the eyes. Neither relative tympanum size (mean value smaller in males) nor relative length and height of inner metatarsal tubercle (means of both values larger in males) were significantly different between sexes (U-test, P>0.05), but the latter may be due to small sample size.

Habitat and habits. Calling males were found in all months from December to March, indicating a prolonged mating activity during the rainy season. They were sitting horizontally in the vegetation (1.5-2.5 m above the bottom) along very small (mostly smaller than 0.5 m in diameter) and slowly running brooks, in pristine or degraded forest.

Advertisement calls. Calls were recorded at An'Ala (on 21 March 1995 at 22 °C air temperature) and Andasibe (on 16 January 1995, 19.00 h). They were long-lasting regular note series (up to several minutes). Notes (Fig. 2) were unharmonious. At An'Ala, note duration was 90-113 ms (99 ± 7 ms, n = 32), duration of intervals between notes was 616-1280 ms (825 ± 140 ms, n = 31), note repetition rate was ca. 1/s. One analyzed note consisted of 20 pulses and had a pulse repetition rate of 227/s. Frequency was 1150-2500 Hz, dominant frequency 1400-1950 Hz. At Andasibe, note duration was 93-111 ms (102 ± 6 ms, n = 10), duration of intervals between notes was 536-903 ms (720 ± 131 ms, n = 9), note repetition rate was ca. 1.3/s. One note was composed of ca. 23 pulses. Frequency was 1000-5100 Hz, dominant frequency 1300-2100 Hz.

Distribution. The species is reliably known from Andasibe (type locality, ca. 900 m altitude), An'Ala (personal observations and call recordings, ca. 840 m altitude), and most probably from Vohidrazana (only one female specimen; no calls heard, 730 m altitude). The locality Marojezy mountains, above 1300 m altitude (Glaw & Vences 1994), refers to *M. tandroka,* which is described below. All additional records of this species (Andreone 1994, Glaw & Vences 1994, Raselimanana 1998, Raxworthy et al. 1998) are in need of confirmation (see also discussion).

Mantidactylus tschenki, spec. nov.

Figs 3-4

Types. Holotype: ZSM 936/2000 (formerly ZFMK 62298), adult male, collected along the road between Ambatolahy and Ranomafana, south-eastern Madagascar, on 28 February 1996 by F. Glaw, D. Rakotomalala and F. Ranaivojaona. – Paratypes: ZFMK 62296 and 62297, adult males, collected close to the village Ranomafana

Fig. 3. *Mantidactylus tschenki*, spec. nov. (holotype ZSM 936/2000 in life, dorsolateral view).

Fig. 4. *Mantidactylus tschenki*, spec. nov. (holotype ZSM 936/2000 in life, ventral view).

Fig. 5. Calling male of *Mantidactylus cornutus* from Andasibe.

Fig. 6. Calling male of *Mantidactylus tschenki*, spec. nov. from Ranomafana (Foto: F. Andreone)

(21°14' S, 47°26' E, ca. 550-600 m above sea level), same date and collectors as holotype. MRSN A379, adult male, collected by F. Andreone at Ranomafana.

Diagnosis. *M. tschenki*, spec. nov. is characterized as a member of the genus *Mantidactylus* by presence of femoral glands and lack of nuptial pads in males, and by its close similarity to *Mantidactylus cornutus*. *M. tschenki* can be distinguished from that species by (a) the very different advertisement calls, (b) a different shape of the inflated vocal sac in calling males (single subgular in *cornutus*, slightly bilobed subgular in *tschenki;* Figs 5-6), (c) possibly by a slightly lower body size (SVL of adult males 38-40 mm in *cornutus*, 35-36 mm in *tschenki*).

Description of the holotype

Adult male, SVL 36.1 mm. For measurements, see table 1. Body slender; head longer than wide, slightly wider than body; snout pointed in dorsal and lateral views; nostrils directed laterally, slightly protuberant, much nearer to tip of snout than to eye; canthus rostralis distinct, concave; loreal region concave; tympanum distinct, elliptical (slightly higher than wide), 44 % of horizontal eye diameter; supratympanic fold present, straight; tongue ovoid, distinctly bifid posteriorly; vomerine teeth distinct, in two rounded aggregations, positioned posterolateral to choanae; choanae rounded. Arms slender, subarticular tubercles single; outer and inner metacarpal tubercles present; fingers without webbing; relative length of fingers $1 < 2 < 4 < 3$, finger 2 distinctly shorter than finger 4; finger disks distinctly enlarged; nuptial pads absent. Hindlimbs slender; tibiotarsal articulation reaches widely beyond snout tip; lateral metatarsalia partly connected; inner metatarsal tubercle distinct, outer metatarsal tubercle not recognizable; webbing formula between toes 1 (1), 2i (2), 2e (1), 3i (2), 3e (1.5), 4i (2.75), 4e (2.5), 5 (1). Skin on the dorsal surface smooth; back with indistinct and irregular dorsolateral folds; two distinct, slightly elevated blackish tubercles between the eyes; a number of small granules and dermal spines above the eyes; no distinct enlarged tubercles in the cloacal region; ventral skin smooth on throat, slightly granular on belly. Femoral glands very poorly delimited and very indistinct from both external and internal views; a patch of 10-15 small granules are visible from internal view.

Colour after four years in preservative rather uniformly greyish brown dorsally, with a dark brown transversal band between the eyes which encloses the pair of blackish tubercles. Limbs with rather indistinct brown crossbands. Head laterally with two narrow white stripes running from the eye to the upper lip. Ventrally cream with irregular greyish brown pattern on belly and limbs. Throat (vocal sac) greyish with a lighter mottling and one discontinuous and irregular median light stripe.

Colour in life. Colour slides are only available of the holotype ZSM 936/2000 (Figs 3-4). Dorsal colouration and upper flanks brown. Three distinct dark brown crossbands were present on femur and tibia. The iris was silvery with a reddish brown spot on its posterior edge. The pupil was horizontal. A distinct white spot between posterior edge of eye and upper lip. The venter was dirty white with brownish spots on the shoulder girdle, the ventral surface of hindlegs was brownish except for the yellowish femoral glands. The throat was marbled brown and white.

Variation. The two paratypes correspond morphologically very well to the holotype. The throat lacks a light median stripe in both specimens. Colouration of ZFMK 62297 is dorsally similar to the holotype except the darker head sides and a more distinct narrow horizontal dark brown stripe underneath the canthus rostralis and the supratympanic fold. In ZFMK 62296, a different colour pattern is present which is also known in *M. redimitus* and *M. cornutus*: A distinct beige stripe runs (on each side of the body) from the snout tip along the canthus rostralis, over the eyes, broadens as dorsolateral band along the anterior back and finally makes up the whole of the flank colour on the posterior part of the body.

Habitat and habits. Calling males were sitting at night (end of February and beginning of March) on vegetation ca. 1-2 m above the bottom. They were found in primary rain forest and in degraded vegetation as well. In at least one case no water body was recognized in the vicinity of the calling males.

Advertisement calls. Vocalizations were recorded at the type locality on 2 March 1996 at ca. 22 °C air temperature: Notes (Fig. 7) are unharmonious, distinctly pulsed and emitted in regular series. Temporal parameters were as follows: Note duration 274-335 ms (293 ± 16 ms, $n = 20$), interval duration 1018-2076 ms (1393 ± 274 ms, $n = 18$). Notes consist of 16-21 pulses (18 ± 1, $n = 20$), the pulse rate is 58-68 (63 ± 2, $n = 20$) per second. Frequency range is 1300-4000 Hz (dominant frequency 2500-2900 Hz, another emphasized frequency band also from 1450-1550 Hz).

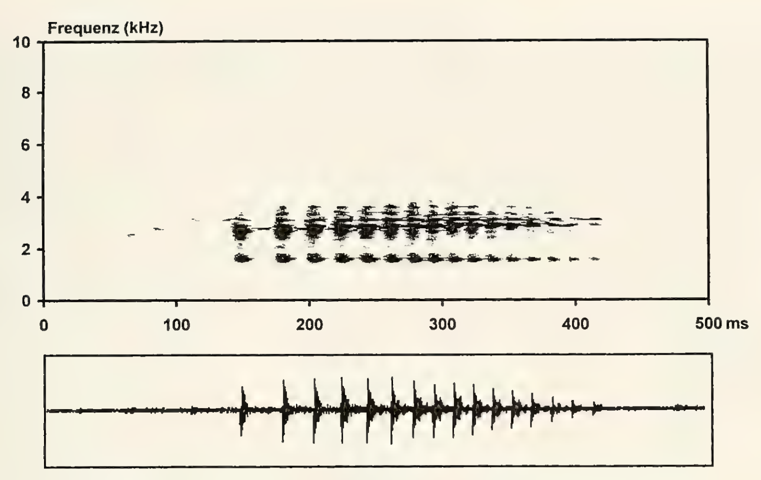


Fig. 7. Sonagram and oscillogram of one note of *Mantidactylus tschenki*, spec. nov.

Distribution. *Mantidactylus tschenki* is reliably only known from the type locality. Several additional specimens (and thus localities) possibly belong to *M. tschenki*, but a reliable attribution to either species is not possible by morphology alone (see discussion).

Etymology. *Mantidactylus tschenki* is dedicated to Michael Tschenk, in recognition of his generous support to the biosystematic research at the ZSM.

Relationships. *Mantidactylus tschenki* appears most closely related to *Mantidactylus cornutus*. Both species are very similar by their morphology.

Subgeneric attribution. *Mantidactylus tschenki* is included in the subgenus *Phylacomantis* Glaw & Vences, 1994 based on its similarity to *M. cornutus*.

Mantidactylus tandroka, spec. nov.

Figs 8-9

Types. Holotype: MNHN 1973.924, adult male, collected by Ch. P. Blanc on 2 July 1972 at the Marojezy massif, 1300 m altitude. – Paratypes: MNHN 1973.922, 1973.926-930, two adult males, three females and one subadult specimen, same collecting data as holotype. MNHN 1973.912, adult male, collected on 29 November 1972 by Ch. P. Blanc at the type locality. ZFMK 59894 and ZSM 937/2000 (formerly ZFMK 59895), two adult females, collected by F. Glaw and O. Ramilison on 28 February 1995 at Marojezy, Campsite 4 (ca. 1300 m altitude).

Diagnosis. *M. tandroka* is characterized as a member of the genus *Mantidactylus* by presence of femoral glands and lack of nuptial pads in males, and by its general similarities to *Mantidactylus cornutus*, *M. tschenki*, and *M. redimitus*. It is morphologically most similar to *M. cornutus* and *M. tschenki* but can be distinguished from these species by (a) different head proportions, with a shorter snout and a larger head width relative to SVL (see Fig. 10), (b) presence of distinct pattern of longitudinal folds on the back which is not found in any specimen of *cornutus* or *tschenki*: a pair of folds, absent in the other species, starts behind the eyes and converges on the anterior back, fading in an area enclosed by the dorsolateral folds. Some specimens of *M. tandroka* also remind the sympatric *M. leucomaculatus*; this species, however, differs by lack of the tubercle pair between the eyes (black spots may be present but are never prominent), lack of dorsal ridges, and the presence of laterally blackish vocal sacs in males.

Description of the holotype

Adult male, SVL 38.7 mm. For measurements, see table 1. Body slender; head longer than wide, wider than body; snout slightly pointed in dorsal view, truncated in lateral view; nostrils directed posterolaterally, slightly protuberant, much nearer to tip of snout than to eye; canthus rostralis distinct,



Fig. 8. Female paratype (ZSM 937/2000) of *Mantidactylus tandroka*, spec. nov. from Marojezy in life (dorsolateral view).

straight; loreal region concave; tympanum distinct, elliptical (higher than wide), 50 % of horizontal eye diameter; supratympanic fold very distinct, slightly curved; tongue ovoid, distinctly bifid posteriorly; vomerine teeth distinct, in two rounded aggregations, positioned posterolateral to choanae; choanae rounded. Arms slender, subarticular tubercles single; a paired outer and a single inner metacarpal tubercles present; fingers without webbing; relative length of fingers 1<2<4<3, finger 2 distinctly shorter than finger 4; finger disks distinctly enlarged; nuptial pads absent. Hindlimbs slender; tibiotarsal articulation reaches distinctly beyond snout tip; lateral metatarsalia partly connected; inner metatarsal tubercle distinct, outer metatarsal tubercle very small, almost not recognizable; webbing formula between toes 1 (1), 2i (2), 2e (1), 3i (2), 3e (1.25), 4i (2.75), 4e (2.5), 5 (1). Skin on the upper surface smooth; back with many irregular smaller folds, arranged as a discontinuous network; a pair of distinct folds runs from behind the eyes, converge centripetally onto the anterior back, curves slightly towards the flanks and fades; laterally from these, a pair of dorsolateral folds runs from ca. 4 mm behind the supratympanic fold to the inguinal region. Two distinct, blackish tubercles between the eyes; a number of granules and small dermal spines above the eyes; no distinct enlarged tubercles in the cloacal region; ventral skin slightly granular on belly, smooth on throat where the presence of a single vocal sac is clearly recognizable. Femoral glands very poorly delimited and very indistinct from both external and internal views; a patch of 16 small granules are visible from internal view.

Colouration dorsally brownish, slightly lighter on the back and head in an area delimited by the dorsolateral folds. Limbs light brown with brown crossbands: three to four bands on forelimb, four to five on femur, four to six on tibia, five to six on foot and tarsus. Flanks brown fading into cream towards the belly. Head laterally brown, with a distinct horizontal dark brown stripe running underneath the canthus rostralis and the supratympanic fold. Two light vertical stripes run from underneath the eye to the upper lip. Lower lip brown with five narrow light vertical markings. Ventrally brownish with irregular light mottling on the throat (vocal sac), cream on the remaining surface, with brown mottling in the breast region and on the hindlimbs.



Fig. 9. Female paratype (ZSM 937/2000) of *Mantidactylus tandroka*, spec. nov. from Marojezy in life (ventral view).

Colour in life. Colour slides of living specimens are only available of the female paratype ZSM 937/2000 (Figs 8-9). The dorsal colouration was light brown to beige, the flanks were light brown fading into pinkish towards the venter. The limb crossbands were greyish brown. A black stripe below the canthus rostralis from snout tip to eye and below the supratympanic fold. Tympanum dark brown. The iris was light yellowish brown in its upper third, dark reddish brown in its two lower thirds. The pupil was horizontal. The venter was partly transparent with a pinkish shade, more cream coloured in its posterior part and on the hindlimbs. The throat was dirty white and unspotted.

Variation. Morphologically, the paratypes agree well with the holotype. The general impression of a broad and relatively short head is very typical in all available specimens. Two specimens (MNHN 1973.927-928) show light stripes from snout tip along canthus rostralis and above eye. These stripes become broader immediately behind the eyes and along the supratympanic fold, making up the entire flank colouration from the forelimb insertion on. The distinct and sharp colour border between light flanks and dark dorsum is situated slightly below the dorsolateral folds. A similar pattern is known in *M. redimitus* and *M. cornutus* and described above for one *M. tschenki* paratype. In these species, however, the light colour on the flanks is less extended. The expression of this pattern thus may constitute another relevant diagnostic character of *M. tandroka*. The male MNHN 1973.926 shows very distinct broad cream-white vertical bands running from the anterior and the posterior eye corners to the upper lip, respectively, reminding the pattern found regularly in *M. leucomaculatus*. Generally, in most preserved specimens (also in the females ZFMK 59894, although not in the figured specimen ZSM 937/2000; Figs 8-9) the throat shows an intense brown pattern, as opposed to the greyish colour in *M. redimitus, M. cornutus,* and *M. tschenki*. As far as visible in the preserved males the vocal sac is single subgular although a slightly bilobed shape as in *M. tschenki* can not be excluded before observations of calling males become available. Altogether, male SVL in the type series was 38.7-41.4 mm (39.3 ± 1.2 mm, $n = 5$), female SVL 39.6-44.7 mm (41.8 ± 2.2 mm, $n = 5$). Mean male size was 94 % of mean female size, sexual size dimorphism was statistically significant (U-test, $P < 0.05$). Mean relative tympanum size did not differ significantly between sexes (U-test, $P > 0.9$), while intersexual differences in

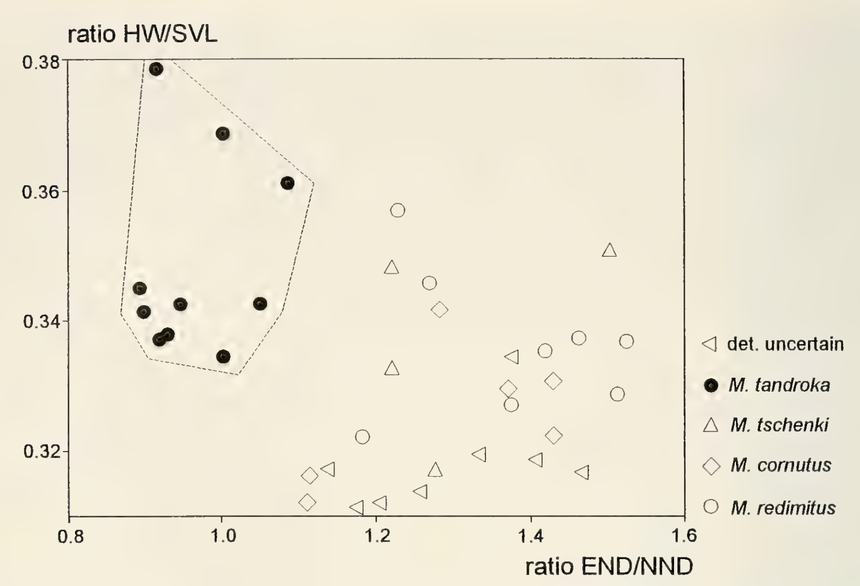


Fig. 10. Scatterplot of HW/SVL ratio vs. END/NND ratio in *Mantidactylus tandroka, M. cornutus* and *M. tschenki,* and *M. redimitus* showing separation of *M. tandroka* from the remaining specimens by head shape parameters.

relative length and height of inner metatarsal tubercle (means of both values larger in males) were significant (U-test, $P < 0.05$).

Habitat and habits. ZFMK 59894 and ZSM 937/2000 were collected during the day on the ground in primary rainforest. Advertisement calls are unknown.

Distribution. *Mantidactylus tandroka* is only known from the type locality, around 1300 m altitude.

Etymology. Derived from *tandroka* (Malagasy: horn), referring to the two horn-like tubercles between the eyes of this and related species (see also the etymology of *M. cornutus*). The name is considered as invariable noun standing in apposition to the generic name.

Relationships. *Mantidactylus tandroka* appears most closely related to *Mantidactylus cornutus* and *M. tschenki.*

Subgeneric attribution. *Mantidactylus tandroka* is included in the subgenus *Phylacomantis* Glaw & Vences, 1994 based on its similarity to *M. cornutus* and *M. tschenki.*

Discussion

Vouchers of uncertain attribution. When preserved, *M. cornutus* and its new sibling species *M. tschenki* are virtually indistinguishable by morphological characters. Therefore, the identity of specimens from four localities (Ranomafana, Andringitra, Col Ivohibe, and Chaines Anosyennes) attributed in Glaw & Vences (1994) to *M. cornutus* is uncertain and commented as follows: (1) The Ranomafana specimen (ZFMK 50593) was defined as paratype of *M. cornutus* by Glaw & Vences (1992b). It is a female of rather large SVL (40.7 mm) in comparison to the four available specimens of *M. tschenki* (all males). Despite of this size difference, it may belong to *M. tschenki,* but further fieldwork is necessary to confirm or reject the presence of both species in the Ranomafana area. (2) The specimens from the Chaines Anosyennes, Campsite 4 (MNHN 1972.1471) and Chaines Anosyennes, Ambana (MNHN 1972.1472) are two males in good state of preservation which are larger than the available specimens of *M. tschenki;* furthermore they have a pair of distinct tubercles on the central dorsum lacking in *M. tschenki* (but present in the Ivohibe specimens). (3) The three specimens from Col d'Ivohibe, 1400 m altitude (MNHN 1953.74, 1991.2940-2941) are in mediocre state of preservation but agree better with *M. cornutus* than

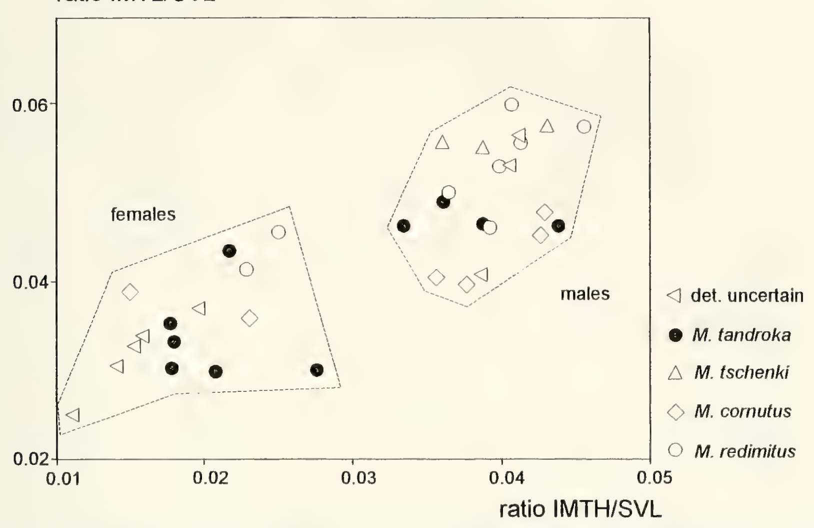


Fig. 11. Scatterplot of relative length and height of the inner metatarsal tubercle (ratios IMTL/SVL and IMTH/SVL) in *Mantidactylus redimitus, M. cornutus, M. tschenki,* and *M. tandroka,* showing sexual dimorphism in IMT size. Original measurements from Tab. 1 (except type of *M. redimitus*).

M. tschenki regarding body size. (4) The two Andringitra specimens (MNHN 1972.571-572) are rather small and in bad state of preservation; they are females, and it can not be verified whether they are actually full-grown adults (only immature oocytes observed after dissection). Summarizing, more fieldwork is necessary to clarify the identity of these four populations.

Distribution pattern in *Phylacomantis.* Although one of the new species described in the present paper *(M. tschenki)* is only known from south-eastern Madagascar, the new data which have been gathered during the last years clearly show that the subgenus *Phylacomantis* has its center of diversity and endemism in northern Madagascar which together make up less than ⅕ of the Malagasy territory. Including a further new *Phylacomantis* species from the central east (Andasibe) and Marojezy which is being described elsewhere, only three out of nine *Phylacomantis* species *(M. cornutus, M. tschenki, M. corvus)* are not known from northern Madagascar and three species appear to be northern endemics *(M. granulatus, M. pseudoasper, M. tandroka)*. The highest diversity is found in the Marojezy massif where six species occur: *M. redimitus, M. tandroka, M. leucomaculatus, M. granulatus, M. pseudoasper*, and the new species which is being described in a separate paper. This high degree of sympatry is in part characterized by a restricted altitudinal distribution at Marojezy (e.g. *M. tandroka* to the high elevations above 1000 m, *M. granulatus* mainly at low altitudes). Such an altitudinal segregation may be one factor favouring the extraordinary anuran diversity in Madagascar and the high degree of range overlap among closely related species.

Shared characters in *Phylacomantis.* The new morphological and bioacoustic data presented allow for the discussion of some general trends in the subgenus *Phylacomantis*. In two species in which males and females were available *(M. redimitus, M. tandroka)*, a sexual dimorphism in size of the inner metatarsal tubercle was noted, males having distinctly larger tubercles than females. Actually, no overlap between males and females was noted even pooling the data of all four species studied (Fig. 11). Beside the two mentioned species, the sexual dimorphism of inner metatarsal tubercle within the genus *Mantidactylus* is only known in *M. granulatus* and *M. leucomaculatus* (Glaw & Vences 1994) and some species of the subgenus *Gephyromantis* (pers. obs.), and may be a synapomorphy of this group of species. On the other hand, sexual dimorphism in tympanum size appears to be absent in the species studied here. Such a dimorphism is typical for several *Mantidactylus*, especially species in the brook edge dwelling subgenera (e.g. *Brygoomantis, Chonomantis, Ochthomantis*), and is also found in *M. pseudoasper* (Glaw & Vences 1994), a member of the subgenus *Phylacomantis.*

There is one other character which seems to be restricted to several species of the subgenus *Phylacomantis* and to some members of the subgenus *Gephyromantis*: The laterally banded morph is only known to occur in *M. redimitus, M. cornutus, M. tschenki* and *M. tandroka (Phylacomantis)*, as well as in *M. asper* and *M. luteus (Gephyromantis)* (pers. obs.). All four mentioned *Phylacomantis* species have also dermal spines above the eye, a character shared with another undescribed *Phylacomantis* species, some species of the subgenus *Gephyromantis (M. asper, M. spinifer)*, and species of the subgenus *Spinomantis* (e. g. *M. phantasticus*).

Advertisement calls of *Phylacomantis*, as far as known, are composed of a single note type, although notes can be arranged in groups. The four species studied here share with each other and with *M. granulatus* and *M. leucomaculatus* calls with further structural similarities: They consist of rather regular series of unharmonious notes with a note duration of at least 50 ms and a pulsed structure, possibly reflecting relationships between these species which were placed in a *M. granulatus* group by Glaw & Vences (1994).

Acknowledgements

We are especially grateful to F. Andreone (Torino) who provided the photo of the calling male of *M. tschenki*. D. Rakotomalala, O. Ramilison and F. Ranaivojaona assisted in the field. W. Herwig provided a photographic record of *M. redimitus* from Vohidrazana. Thanks go also to W. Böhme (ZFMK, Bonn) and A. Dubois and A. Ohler (MNHN, Paris) for the loan of type material. The field work was made possible by a cooperation accord between the Zoological Institute at the University of Antananarivo (UADBA) and the "Zoologisches Forschungsinstitut und Museum A. Koenig" (ZFMK). Financial support was granted both to the field work of F. Glaw and the work of M. Vences in the MNHN by the "Deutscher Akademischer Austauschdienst" (DAAD).

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Ein weiterer Band aus der neuen Reihe der Kosmos Naturführer, die dem vornehmlich für die Natur Begeisterten in einem einzigen Band alle wissenswerten und nötigen Reisetips samt einem sehr guten Eindruck von Fauna und Flora des betreffenden Landes geben.

Im ersten Teil werden kenntnisreich die wichtigsten geographischen und politischen Grundlagen abgehandelt, worauf, nach Großräumen geordnet, der eigentliche Reiseführer folgt. Er ist reich mit Karten und Fotos bebildert und wird überdies noch durch zwei Farbtafeln mit charakteristischen Vögeln und Säugetieren aufgelockert.

Der sogenannte Bestimmungsteil besticht durch hervorragende Farbfotos und sehr informative Begleittexte. Naturgemäß spielen unter den Tieren die Säugetiere und Vögel die Hauptrolle, während die Kleintiere, vor allem Insekten und andere Gliederfüßer, etwas stiefmütterlich behandelt werden. Allerdings ist Skandinavien nun auch nicht gerade ein Insektenparadies!

Der Band wird durch die alphabetische Auflistung wichtiger Reiseinformationen sowie ein Register der Namen beschlossen. Ein handlicher, vor allem dem Naturfreund bestens zu empfehlender Reiseführer, der sicher dazu beiträgt, daß der Benutzer alles daran setzen wird, möglichst viele der wunderschön abgebildeten Pflanzen und Tiere auch in natura kennenzulernen. Dann wäre das Konzept eines Natur-Reiseführers aufgegangen.

M. Baehr

24. Laibner, S.: Elateridae of the Czech and Slovak Republics. – Kabourek, Zlìn, 2000. 292 pp. 519 figs, 9 colour plates. ISBN 80-901466-6-X.

This combined taxonomic monography and catalogue covers the Click Beetles (Elateridae) of the former Czechoslovakia. For the benefit of native and foreign users the text is bilingual: in English and in Czech language. After a short introduction about morphology of adults and larvae, biology, agricultural significance, collecting, rearing, and classification, the taxonomic section includes keys to subfamilies, genera, and species. Each taxon is shortly described, and for species some information about ecology and distribution in the covered area is presented. The keys are profusely illustrated with many rather simple but clear and informative line drawings. Most species are figured on one of the 9 colour plates that finish the taxonomic section. A list of species, references, and an index are added.

A nice piece of work that certainly will be of importance not only to Czech and Slovakian users, though for all workers who are interested in the central European elaterid fauna.

M. Baehr

25. Michener, C. D.: The Bees of the World. – The Johns Hopkins University Press, Baltimore & London, 2000. XIV + 913 S, zahlreiche Abb. ISBN 0-8018-6133-0.

Dieses grundlegende Werk über die Bienen der Welt hat in seinem ersten Teil ausführliche, einführende Kapitel von allgemeinerem Interesse zum Beispiel über die Coevolution der Bienen und Pflanzen, ihre soziale Lebensweise, die Morphologie, Systematik und Biogeographie der Bienen. Im zweiten, systematischen Teil des Buches wird auf etwa 700 eng bedruckten Seiten ein umfassender Überblick über die Bienen der Welt gegeben. Es werden alle Taxa bis hinunter zu den Untergattungen dargestellt und klassifiziert. Dabei werden Bestimmungsschlüssel, morphologische Besonderheiten und interessante Hinweise zur Biologie und Verbreitung zusammengestellt. Insgesamt sind etwa 1200 Gattungen und Untergattungen systematisch eingeordnet und behandelt. Dabei wurden verschiedene taxonomische Änderungen – neue Gattungen, neue Namen und Synonyme – durchgeführt. Darüber hinaus wird weltweit die wichtigste Literatur zitiert und kommentiert. Unter den zahllosen Illustrationen bestechen neben vielen Habituszeichnungen besonders die hervorragenden rasterelektronenmikroskopischen Abbildungen, die die morphologische Vielfalt demonstrieren.

Das Buch ist gleichzeitig eine Einführung in die Biologie und Systematik der Bienen und ein umfassendes Nachschlagewerk. Es ist das Lebenswerk eines der wirklich großen Entomologen des 20. Jahrhunderts und zweifelsohne ein Meilenstein der Apidologie.

K. Schönitzer

26. Turin, H.: De Nederlandse Lookkevers. Verspreiding en Oecologie (Coleoptera: Carabidae). – Nederlandse Fauna 3. – Nationaal Natuurhistorisch Museum Naturalis, KNNV Uitgeverij & EIS-Nederland, Leiden, 2000. 666 S., 16 Farbtaf., CD-ROM. ISBN 90-5011-136-X.

Dies ist ein monumentales Werk über die Laufkäfer der Niederlande, das eigentlich nicht mehr viele Fragen offenläßt. Der allgemeine Teil umfaßt allein 124 großformatige Seiten und beleuchtet eine Vielzahl von Aspekten der Taxonomie, Biologie, Ökologie und Verbreitung der Laufkäfer, aber auch der Fang- und Untersuchungsmethoden. Dieser Teil ist umso wertvoller, weil Laufkäfer eine der wichtigsten Gruppen in feldökologischen oder ökofaunistischen Untersuchungen darstellen. Ein beträchtlicher Teil dieser Untersuchungen wurde überdies in den Niederlanden durchgeführt – so erhält dieses Buch einen zusätzlichen Wert.

Im speziellen Teil werden alle in den Niederlanden vorkommenden Laufkäfer ausführlich mit ihrer Gesamtverbreitung, der Verbreitung in den Niederlanden, ihrer Ökologie und Biologie, sowie ihrer Gefährdung behandelt, wobei die Gesamtverbreitung in gerasterten Karten, die Verbreitung in den Niederlanden durch Punktkarten dokumentiert ist. Diagramme zur Habitatbindung sowie für den Fortpflanzungstyp sind gleichfalls für fast alle Arten beigegeben. Ein umfassendes Literaturverzeichnis, eine ausführliche englische Summary, sowie ein Register beschließen das Werk. Zusätzliche Informationen können von der beigefügten CD-ROM entnommen werden. Einige ausgezeichnete Habitusfotos verschiedener Laufkäfer lockern den dicken Band auf. Außerdem sind von den meisten Gattungen noch ein bis zwei charakteristische Vertreter in vorzüglichen Schwarzweißzeichnungen dargestellt.

Das Buch kann als Kompendium der Biologie und Ökologie der mitteleuropäischen Laufkäfer angesehen werden, denn ein beträchtlicher Teil der darin enthaltenen Informationen sprengt den vorgegebenen geographischen Rahmen bei weitem. Das Werk hat nur einen einzigen Nachteil: es ist durchweg in niederländischer Sprache verfaßt, was die Benutzung für den deutschen Leser doch – jedenfalls zunächst – erschwert. Allerdings kann man sich verhältnismäßig rasch einlesen.

Dieses Buch ist sicher ein Muß für alle Ökofaunisten, sowie für all diejenigen, die sich in irgendeiner Weise mit mitteleuropäischen Laufkäfern befassen. Gemessen am Umfang und an der Fülle der enthaltenen Informationen erscheint der Preis durchaus mäßig. M. Baehr

27. Barnard, P. C. (Hrsg.): Identifying British Insects and Arachnids: an Annotated Bibliography of Key Works. – Cambridge University Press, 1999. XIII + 353 S., ISBN: 0-521-673241-2.

In diesem Werk werden die verschiedenen Ordnungen von Insekten, die in Großbritannien vorkommen, kurz vorgestellt und die Literatur zitiert, die zur Bestimmung der jeweiligen Gruppe dient. Sehr hilfreich sind kurze Anmerkungen, die die Literatur kommentieren. Darüber hinaus enthält das Werk auch je ein Kapitel über Pseudoskorpione, Opiliones, Acari und Spinnen. Obwohl das Buch auf die britische Fauna ausgerichtet ist, sind die Angaben oft für ganz Europa von Wert und helfen nicht nur Entomologen, die sich speziell für die britische Fauna interessieren. Hilfreich und von allgemeinem Wert ist auch die Einführung über die verschiedenen Informationsquellen in der Entomologie. K. Schönitzer

28. Cole, T. C. H.: Wörterbuch der Tiernamen. Latein – Deutsch – Englisch. Deutsch – Latein – Englisch. – Spektrum Akademischer Verlag, Heidelberg & Berlin, 2000. 970 S., ISBN 3-8274-0589-0.

Dieses Werk enthält die Namen von 16000 Tieren in lateinischer, englischer und deutscher Sprache. Es enthält sowohl wissenschaftlich korrekte Bezeichnungen, als auch sogenannte Trivialnamen und Synonyme. Verständlicherweise sind vor allem Säugetiere und Vögel sowie Nutztiere besonders gut vertreten. Aber auch Insekten und andere Wirbellose kommen nicht zu kurz. Ein unentbehrliches Nachschlagewerk für alle, die Tiere richtig beim Namen nennen müssen. Das Werk ist auch mit einer CD-Rom erhältlich, die natürlich über noch mehr Suchmöglichkeiten als die gedruckte Version verfügt. Ein Nachschlagewerk, das in keiner zoologischen Bibliothek fehlen darf und das in Zukunft hoffentlich viele Übersetzer und Autoren populärwissenschaftlicher Werke vor oft so peinlichen Fehlern bewahren wird. K. Schönitzer

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Proceedings of the FORUM HERBULOT 2001 Neotropical Geometridae: Approaches to a Modern Concept of the Geometrid System on Genus and Tribe Level (8.3.-9.3.2001)

Axel Hausmann & Robert Trusch (ed.)

Hausmann, A. & R. Trusch (ed.) (2001): Proceedings of the Forum Herbulot 2001; Neotropical Geometridae: Approaches to a Modern Concept of the Geometrid System on Genus and Tribe Level (8.3.-9.3.2001). – Spixiana **24/3:** 193-202

The objectives, a list of participants and a short report on the results of the Forum Herbulot 2001 is presented emphasizing the great impact that this meeting had for coordinated, modern research in Geometridology and for creating a worldwide, IT-based network of scientists working on Geometridae. The abstracts of nine lectures from the seminary session of the Forum Herbulot are added.

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Objectives

Research on zoological systematics at the ZSM and its focus on Geometridae: towards a worldwide network of Geometrid researchers (from the 'introduction', shortened).

Axel Hausmann, ZSM

Claude Herbulot (Paris) has been known as the author of an amazing number of publications contributing valuably to the knowledge of taxonomy and systematics of the Geometridae of the world. His famous collection is now housed in the ZSM.

The fine collection as well as the productive enthusiasm of *Claude Herbulot* is a strong incentive for the pursuit of effective scientific work on Geometridae in the ZSM as regards the systematic order, taxonomical questions, biogeography and evolution, but also the use of IT in research and collection management. The FORUM HERBULOT shall focus on problems that can only, or better, or quicker, be solved by the personal co-operation of the leading specialists of our days. FORUM HERBULOT is therefore not meant to be just another congress but shall offer an opportunity for Geometridae-specialists to archieve tangible results that enhance top level progress in the field of Geometridology.

The ZSM houses one of the largest Lepidoptera collections in the world. Many years ago, such museums ceased to be part of 'Royal Natural Curiosity Cabinets', or collections for their own sake that can be mockingly considered as 'Zoological Registration Offices' (Autrum), but have become indispensable partners in research into biodiversity, biogeography, evolution and systematics. In systematics (with correlating taxonomy) research is almost exclusively left to the museums; in German universities at least there are now very few professorships in systematic zoology.

Our responsibility for systematic research is a great challenge. Most museums – as a result of having far too few personnel – are confronted with serious problems with the arrangement and curation of the collection (collection management) and with making the collection accessible by modern



IT (cataloguing). On the other hand, computer techniques, methods of molecular biology, and recent, refined results from geology, climatology and palaeontology offer exciting new possibilities for systematic research. Coordination of the limited resources is strongly needed. Under the given conditions, continuous mutual exchange of opinions and information between specialists on the base of personal contacts may be the best way to achieve successful progress in systematic research. Neither regional nor professional frontiers should play a limiting role here.

The work in the Lepidoptera department of the ZSM is particularly and strongly focussed on Geometridae. For this reason the ZSM was proposed as the organisational framework for a forum for a worldwide network of Geometridae specialists. The name "Forum Herbulot" has been chosen in order to express the admiration and the deep respect for the magnificent lifework of a Grand-Master of our Geometridae guild, but mainly, because the name Herbulot symbolises today in a unique way, what must be regarded as the most important prerequisite for advanced systematic research, i.e. profund knowledge of Geometridae in all the continents. The outstanding and beautiful collection Herbulot with so many types and so many correlated publications forms an extraordinarily fruitful basis for our work.

I am very glad, that our friend Herbulot was able to accept the invitation. So, his honorary lecture on South American Eupithecia will be a highlight of the Forum, and we have the opportunity to give him our warmest congratulations for his 93rd birthday, which he celebrated just 3 weeks ago. I have to admit, that this factor played a certain role in choosing this date for our Forum.

Participants

Chairman **A. Hausmann**, ZSM, Munich

Opening address **G. Haszprunar**, director of the ZSM, Munich

Gunnar **Brehm**, University of Bayreuth, Germany; Charles V. **Covell**, University of Louisville, U.S.A.; Philippe **Darge,** Clenay, France; Sven-Ingo **Erlacher**, University of Jena, Germany; Claude **Herbulot**, Paris, France; Igor **Kostjuk**, University of Kiew, Ukraine; Martin **Krüger**, Transvaal Museum Pretoria, South Africa; Andreas **Kunkel**, ZSM (Generaldirektion); Michael **Miller**, ZSM; Vladimir **Mironov**, Acad. Sci. Russ., St. Petersburg, Russia; Linda **Pitkin**, The Natural History Museum, London, U.K.; Peder **Skou**, Apollo Books, Stenstrup, Denmark; Manfred **Sommerer**, München, Germany; Dieter **Stüning**, Zoologisches Forschungsinstitut und Museum A. Koenig, Bonn, Germany; Robert **Trusch**, ZSM; Janusz **Wojtusiak**, Jagiellonian University, Kraków, Poland.



Short Report and Results

A. Hausmann, R. Trusch, C. Covell, M. Krüger, L. Pitkin

1. Aims of the FORUM HERBULOT as outlined by the chairman were agreed upon by the participants. The need for closer scientific cooperation among geometrid researchers was expressed.
2. The seminar session highlighted promising possibilities for systematic research. The importance of Gondwana studies was stressed by M. Krüger. Generic revisions of Ennominae (neotropical) by L. Pitkin prompted the question of tribal definitions which must be consistent in the other faunistic regions as well. A tentative tribal classification would seem worth working out and helpful. Research on Sterrhinae and Eupitheciini could be broadened to an interfaunistic scale (C. Covell; A. Hausmann; V. Mironov) and thus bridge existing gaps (e.g. *Eupithecia* in Africa as correlated to Asia and/or other regions).
   Molecular methods (e.g. working groups in Sweden and at the ZSM) need refining to form a more powerful tool for evolutionary and systematic studies and should supplement the morphological and ecological context.
   A linkage between the GEDIS transects in Ecuador (DFG) and the fascinating altitudinal borderlined sections of the *Erateina*-research (J. Wojtusiak) appears very desireable.
3. A proposal to continue the FORUM HERBULOT at the ZSM in 2003 was welcomed. An internet facility should be provided at the ZSM as a platform to continue cooperation between researchers and specialists; A. Hausmann, L. Pitkin, C. Covell, M. Krüger will supervise the goals and ways and means to achieve them.
4. Participants expressed their thanks to the organizers and sponsors of the FORUM HERBULOT 2001 and enjoyed the pleasure of attending the ceremony of the awarding of the Spix-Medal to Claude Herbulot.

Abstracts
(Lectures of the Seminar Session)

On Neotropical *Eupithecia*

Claude Herbulot, 67, rue de la Croix Nivert, F-75015 Paris, France

Eupithecia is a genus with a very large number of species, in fact with the greatest number of species within the family Geometridae: 1,332 if we only consider the species and ignore the subspecies that have been listed by Malcolm J. Scoble in his inventory in 1999. However, to be honest I don't always agree with his classification of certain taxa as species or subspecies.

The genus *Eupithecia* is represented throughout the whole world as you can see on the globe on the transparency where red stripes show all the regions where the genus is known to exist. This picture is misleading in one respect, in that it fails to show correctly the important facts that the genus is well represented in Japan, Taiwan and Yunnan but only sparsely in Indochina, Malaysia and in the Sundas and that there are only two species in Australia and none in New Zealand.

Eupithecia species can be found from sea level to altitudes reaching about 4,000 metres. But, even though in moderate climates you can find them as well in the low lands as in the mountains, the rule is that in tropical regions you only find them in higher altitudes (starting at about 1000 metres).

Attempts have been made to divide such a large genus into smaller groups but, it is a very homogenous group, and the elements subject to differentiation are merely features of little importance such as a double areole instead of a single one in the neuration of the wings or differences in the structure of the antennae of the males. These variations are, as you know, not strong enough to define a genus. That is why none of the attempts to split the genus have succeeded.

Up to now, 352 species of *Eupithecia* are known in the Neotropics, i.e. more than a quarter of all known species, their distribution being very scattered: 44 species have been found in South Mexico, 39 in Central America, 9 in the Antilles, 9 in Venezuela (including Trinidad, Guyana, Surinam and French Guiana), 149 in Columbia, Ecuador, Peru and Bolivia (4 countries that I pool because a great many of the species found there are found in all of these countries), 26 in Brazil, 64 in Chile and 18 in Argentina and the Falkland Isles. However, this is far from being the true number of species in the region, as the investigation in most of the countries is only just starting. This is particularly true for the four central Andean countries. I estimate that the number of known species in these countries is barely half of all the species actually present. Strong support for this opinion can be found in my own collection in which the species from Ecuador and Peru are well represented and where the number of species I was able to label with a scientific name is more or less the same as the number of species I was unable to determine.

The males of some *Eupithecia* species in the Neotropics show special features which are found nowhere else, as you will be able to see on the drawings on the next slides. The hindwings can be shortened, cut shorter, or more or less peaked. The forewings, as well as the hindwings, may have fossules and swellings on their upper surfaces as well as on their undersides. The underside of the forewings sometimes has long patches with hairs. As a rule the species showing such features seem to be mainly species from lower and intermediate altitudes, even though I also caught one at 3,200 metres. Numerous genera have been created for all these species but, as I already told you, they cannot be considered as valid: the females of these species do not show any special features and the male genitalia are of the same type as those of all the other species of the genus.

It follows a characterisation of the seven groups of countries to which the author attributed all the neotropical *Eupithecia* species (South Mexico; Central America; Antilles; Venezuela, Trinidad, Guyana, Surinam, French Guiana; Columbia, Ecuador, Peru, Bolivia; Brazil; Chile; and Argentina, Falkland Islands).

The genus *Eupithecia* is well represented in South America, perhaps even better than in the rest of the world, if one considers the quota of species still to be discovered. Furthermore some neotropical species show special morphological features which are without parallels in any other region. Can we use these findings when searching for the place on earth where the genus originated? I do ask this question but I do not dare to answer to it.

Suprageneric Classification of the Ennominae: The Neotropical Component

Linda Pitkin, The Natural History Museum, Department of Entomology,
Cromwell Road, London SW7 5BD, U.K. E-mail: lmp@nhm.ac.uk

The subfamily Ennominae is the largest in the Geometridae, comprising approximately 10,000 species (about half of the total number in the family) in 1100 genera. Many of the genera are poorly defined, and the classification above that level is still inadequately resolved. Studies in recent decades, particularly by Holloway ([1994], focussing on the Bornean fauna), Rindge, Scoble, and other authors) have helped to improve the definition of various tribes and the taxa included in them, but much more study is needed.

The Neotropical component of the Ennominae is species-rich, with about 3300 species in about 300 genera. These genera have been the subject of a nearly completed review (Pitkin, in prep.), and their placement within tribes, reviewed in the same work, is considered here, together with some of the defining characters of those tribes. Study of the Neotropical fauna generally supports the usage of family-group names within the Ennominae as reviewed by Holloway ([1994]), but a few further synonyms have been found amongst these names.

Prior to recent decades, many Neotropical genera were dubiously assigned to tribes, or not at all. Certain tribes have benefited enormously from more recent revision, notably the Nacophorini and Lithinini (Rindge, 1983 and 1986 respectively), the Palyadini (Scoble, 1995), and the Macariini (Scoble & Krüger, in prep.). The current review of the Neotropical Ennominae broadens the scope of a number of tribes by newly assigning many genera to them. This is most marked in the tribes Ourapterygini (which gains 20 Neotropical genera) and Cassymini (which gains 10 Neotropical genera). The supra-generic classification of the Ennominae requires further resolution and some of the tribes may not be monophyletic.

Ennomine tribes represented in the Neotropical Region

	Total number of Neotropical genera	Newly assigned
Azelinini	2	0
Caberini and Baptini	15	6
Boarmiini	16	7
Melanolophiini [subgroup of Boarmiini]	10	0
Cassymini	14	10
Lithinini	12	3
Macariini	3	0
Nacophorini	43	11
Nephodiini	12	7
Ourapterygini	40	20
Palyadini	6	0
'Cratoptera group'	9	9

More than 60 Neotropical genera remain unplaced. Ennomine tribes with Neotropical representation probably excluded now are Angeronini, Crocallini, and Campaeini.

On the tribal classification of southern African Ennominae (Lepidoptera, Geometridae)

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Since the 1930's, the geometrid fauna of southern Africa has been considered as relatively well known. This notwithstanding, revisions published during the past decade have shown that the subregion is inhabited by an unexpectedly high number of Ennominae, with 545 species in 104 genera thus far described. The three largest tribes, Macariini, Ennomini, and Boarmiini comprise more than 40 % of genera and 67 % of species. Examples of less well represented groups include Cassymini, Caberini, Diptychini, Abraxini, Eutoeini, Lithini, and Gnophini.

The distribution of these taxa on both the species- and genus levels is highly skewed and of zoogeographic interest. The distribution of Macariini is concentrated in the savannas of the northern

and eastern parts of the area. This pattern is in accordance with the utilization of Fabaceae, especially the species-rich genus Acacia, by most of its representatives. Conversely, boarmiine diversity is centered around afromontane forests, although the tribe also enjoys a substantial representation in the savanna biome. Perhaps most interesting from a phylogenetic point of view are Ennomini, which inhabit mainly the macchia-like Fynbos areas of the Western Cape Province and the semi-arid Karoo. In the northern parts of southern Africa Ennomini are largely montane, which, supported by geological and phytogeographical data, points towards an ancient origin of this group.

Studies on the Neotropical Sterrhinae (Geometridae) and Correlation of Species with those in the North American Fauna

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Status of North American studies on Sterrhinae:

A. Moths of America North of Mexico series, Fascicle 18.1: progress report
B. Synonymies of species-group names of species in United States and also in Mexico and other Central and South American countries
C. Un-named or unreported N. American/neotropical species additional to Covell (1983)
D. Currently known Sterrhinae genera and species fauna of North America – Sterrhini (species numbers in brackets; total species: 100): *Eumacrodes* Warren (1), *Euacidalia* Packard (5), *Protoproutia* McDunnough (2), *Lobocleta* Warren (7), *Idaea* Treitschke (30), *Paota* Hulst (1), *Pigia* Guenée (2), *Odontoptila* Warren (1), *Ptychamalia* Prout (1) – Cosymbiini: *Pleuroprucha* Möschler (2), *Cyclophora* Hübner (7), *Semaeopus* Herrich-Schäffer (5) – Timandrini: *Haematopis* Fabricius (1), *Calothysanis* Hübner (1) – Scopulini: *Acratodes* Guenée (1), *Scopula* Schrank (24), *Leptostales* Möschler (8), *Lophosis* Hulst (1).

Status of work on the neotropical Sterrhinae:

A. Most species are known only from original descriptions, and most were published between 1850 and 1950.
B. Faunal studies have not yet included many records of this subfamily.
C. Checklist of Sterrhinae of Costa Rica begun 1997 by Covell, but much of it remains incompleted.
D. Geometridae of Ecuador and Galapagos: Projects of Fr. Francisco Piñas R., PUCE, Quito; Lazaro Roque (Charles Darwin Res. Station), Bernard Landry, and Covell on the "Lepidoptera of the Galapagos Islands"; and the work of colleagues speaking at this Forum (cf. Gunnar Brehm et al.)
E. Resources at University of Louisville for further systematic studies: 1. Type information & pictures; 2. Literature; 3. Collections
F. Major areas of consideration: 1. Microtaxonomy: Species recognition, descriptions, synonymies, etc.; 2. Consideration of generic and tribal classification (Holloway's recent synonymising of *Anisodes* Guenée to *Cyclophora* Hübner; question of Cyllopodini as Sterrhinae, etc.); 3. Faunal investigations
G. Dedication: New species of *Cyclophora* from Galapagos to be named *herbuloti* in honor of our distinguished colleague, Claude Herbulot (C. Covell & L. Raque-Albelo).

Neotropical moths of the genus *Erateina* (Geometridae, Larentiinae). Evaluation of morphological and genital characters for the purpose of systematic revision of the genus

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Studies on moths of the neotropical genus *Erateina* Doubleday, 1848, encompassing 89 species and 20 subspecies, were aimed to examine external morphology and genital structures of adults to select characters of primary importance for establishing possible evolutionary relationships within the group. These included also SEM method of examination of microstructures on males' scent organs, which are developed on hind wings of most of the species. As a result, nine distinctive groups of species can be

distinguished within the genus. Some species do not fit well into any of these groups and show intermediate characters.

Morphological differences between species are unusually high in *Erateina*. This concerns especially the variability of hind wing shape, its size and colour pattern. Male genitalia are characterised by wide, triangular valvae with broadly rounded posterior margin and by a set of tiny rows on internal surface. Species of all groups bear short, straight or hooked thorn in outer part of the ventral edge of valva, cristae are well developed, stalked but their size varies from group to group.

Female's genital structures are characterized by a very large bursa copulatrix which is bulbous in anterior part and narrow and conical in the posterior. Asymetric sclerotisation inside the bursa is especially thick at the posterior part and occupies about half of the lenght of the organ.

Scent organs, that seem to play a role in a chemical communication between sexes, also show a variety of types, from the simplest, bearing only one type of scent scale, as in *E. coeruleopicta* or *E. meduthina*, to the most elaborate ones, as in *E. drucei* and *E. subundulata*. The research is being continued to estimate also the relationship of *Erateina* with genus *Heterusia* and *Trocherateina* with which it seems to be the most closely related.

Problems in the study of the tribe Eupitheciini (Lepidoptera: Geometridae, Larentiinae)

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The tribe Eupitheciini is a most species-rich group of the family Geometridae. According to the Catalogue of the Geometrid Moths of the World this tribe includes nearly 1,700 species. The majority of Pug species are small, unattractive grey or brown coloured and can hardly been distinguished from each other by means of external features. They sometimes show no clear morphological differences. Therefore, the identification of many species from the tribe Eupitheciini including European species is extremely difficult. There are some urgent problems connected with the study of the Geometrid Moths of the tribe Eupitheciini, such as:

1. The composition of the tribe Eupitheciini. – Until now, we have no full information about morphological signs differing the representatives of this tribe from others. There is no clear knowledge about how many and which genera form the tribe Eupitheciini. In my opinion, at least 15 genera belong to this tribe, such as: *Axinoptera* Hampson, 1893 (13 species); *Bosara* Walker, 1866 (11 sp.); *Chloroclystis* Hübner, [1825] (17+"128" sp.); *Glaucoclystis* Holloway, 1997 (10 sp.); *Gymnoscelis* Mabille, 1868 (88 sp.); *Eupithecia* Curtis, 1825 (1,330 sp.); *Eupithystis* Holloway, 1997 (1 sp.); *Eva* Vojnits, 1981 (2 sp.); *Micrulia* Warren, 1896 (7 sp.); *Mnesiloba* Warren, 1901 (4 sp.); *Nasusina* Pearsall, 1908 (4 sp.); *Pasiphila* Meyrick, 1883 (36 sp.); *Pasiphilodes* Warren, 1895 (19 sp.); *Prorella* Barnes & McDunnough, 1918 (15 sp.) and *Ziridava* Walker, [1863] (11 sp.).
2. Revision of the genus *Eupithecia* Curtis, 1825. – The genus includes more than 1,300 species. A great number of species, subspecies and taxa of infrasubspecific rank have been described on the basis of single specimens or small series of adults. The descriptions of many species and subspecies do not correspond to modern requirements. Informations on type-specimens of many *Eupithecia* species are still lacking.
3. Revision of the genus *Chloroclystis* Hübner, [1825]. – The genus *Chloroclystis* had been expanded to include a large number of species over many years. According to Holloway (1997), the tropical representatives of this genus demonstrate a strong morphological diversity. I hope that detailed study will undoubtedly show that many species previously associated with *Chloroclystis* should be excluded from *Chloroclystis* and included mainly to the genera *Gymnoscelis* and *Pasiphila* in revision.
4. Distribution of species. – Modern guides, catalogues and atlases on Eupitheciini are absent for many countries and broad geographical regions. We have poor knowledge about geographical variation of many species especially widespread ones. It is necessary to compile the distribution maps for many species of Eupitheciini of the World.
5. Data on phenology, biology, foodplants of larvae and habitats. – Most of these data are known for European and north American species of Eupitheciini. Other regions, especially tropical territories are very poorly studied in these respects.
6. A system of the genus *Eupithecia* Curtis, 1825. – In the history of Lepidopterology many systems

of *Eupithecia* have been published. The traditional order of species of European *Eupithecia* in particular has become imperfect long ago. Closely related species are often placed far away from each other in this system of European *Eupithecia*. In some European faunistic publications, the *Eupithecia* species are arranged totally in disorder. It is necessary to create a new modern system of the genus *Eupithecia* on the basis of more or less clear morphological features, mainly on the basis of structure of the male and female genitalia.

Estimations about the systematic position of *Pseudobiston pinratanai* Inoue, 1994

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Inoue described this peculiar, large, rather bombycoid moth in the Geometridae, subfamily Geometrinae, though he emphasized, on the other hand, the absence of the only known synapomorphy of the Geometridae, the characteristic abdominal tympanal organs. He outlined this placement as being tentative. However, some of the characters figured in his publication seem to support the proposed position: the presence of a tubular vein M2 in the hindwings, arising close to M1; vein M1 in the forewing arising from the commom stalk of R2-R5; large, sclerotized socii in the male genitalia. Other characters are contradictory to this placement or at least rarely found in the Geometrinae: absence of tympanal organs; cross-bar between Sc+R1 and cell in the hindwings, R2 arising from the common stalk of R3+R4 in the forewing (drawn incorrectly in Inoue's publication); tibia of hindlegs with one pair of spurs only; shape of socii and furca-arms in male genitalia.

The aim of this study was to check the given characters and/or to find additional ones supporting or not the systematic placement proposed by Inoue. The results are still rather preliminary:

1. Tympanal organs: not reduced or degenerated, but totally absent. Instead there are normal apodemes as found in many other families;
2. Tergal phragmata: agreeing with the condition found typical for Ennominae and Geometrinae;
3. Chaetosemata: present;
4. Thoracic tympana: absent (some characters, e.g. venation, shape of antennae, specialized shape of scales, small middle- and hind-legs with only one pair of spurs) agree with the conditions found in some Notodontidae, but the absence of thoracic tympanal organs contradict a possible relationship).

The (mostly plesiomorphic) characters studied so far neither support nor contradict reliably the systematic position proposed by Inoue.

Diversity of Geometrid moths along an altitudinal gradient in a Mountain Rainforest in South Ecuador

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(& Dirk Süßenbach, Christoph Häuser, Konrad Fiedler)

Herbivorous insects play an important role in terrestrial ecosystems. Therefore, understanding the extend and determinants of herbivore diversity will be a crucial element of ecosystem analysis. This is presently aimed by a research group of the German Research Foundation DFG. Its subject is to investigate functional aspects in a tropical rainforest in South Ecuador, its diversity, dynamic processes and potentials of use from an ecosystem viewpoint. We chose two model groups, Geometrid and Pyralid moths, in a first step of analysis. Our study area is a mountain rainforest in South Ecuador (1.800-3.100 m asl). We want to answer the following questions.

How large is the diversity of Geometrid moths (alpha diversity)?

So far, we found approximately 700 species or morphospecies in the study area. Fisher's alpha is a diversity measure which is independent of sample size. The area belongs to the hot spots of Geometrid diversity in the world because values between 110 and 130 are achieved. A comparable diversity is thus far only known from SE Asia.

How do communities change along an altitudinal gradient?

So far we investigated an altitudinal gradient between 1,800 m and 2,400 m asl. The distance between the plots is some 100 m elevation. At lower altitudes, communities are dominated by the subfamily Ennominae whereas Larentiinae become more important at higher altitudes.

We use the NESS index as a measure of similarity because abundances of the species and the role of rare species are considered. The ordination method of Multidimensional Scaling (MDS) is used to visualize results and provide appropriate data for further statistical tests.

Which habitat parameters determine the diversity of Geometrid moths?

MDS allows to test correlations between the diversity of the moths and habitat parameters. We cooperate with participants of the DFG research group who work in the same study area. They will provide us with data of vegetation structure, diversity of plant and animal groups and others. These analyses will be carried out in the next months.

Life Histories of Geometrid moths

So far, little is known about the biology of Neotropical Geometrid moths. Larvae were collected in the field and reared to adults. Data for more than 20 species of habitus and food plants of the species can be provided now.

The phylogenetic relationships in Geometrid moths. An approach using mitochondrial DNA (mtDNA) sequences.

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DNA sequence analysis has become a widespread tool for taxonomic identification and reconstruction of phylogeny. However, molecular genetic approaches to phylogenetic reconstruction face the problem that the sequence divergence caused by evolutional processes of the genes targeted for sequence analysis must match the evolutionary pace of the taxon group under consideration. For phylogenetic interpretation it is necessary to find such loci that can provide appropriate 'signal sequences' for phylogenetic interpretation. In a first approach on Geometrid moths we explored the phylogenetic signal from DNA-sequences of the mitochondrial ND1 protein-coding gene and the 16S ribosomal RNA.

Genomic DNA was extracted from 19 specimens of 18 representative taxa of the subfamilies Ennominae, Larentiinae, and Sterrhinae, focussed on subfamily Sterrhinae with 14 taxa. The subse-

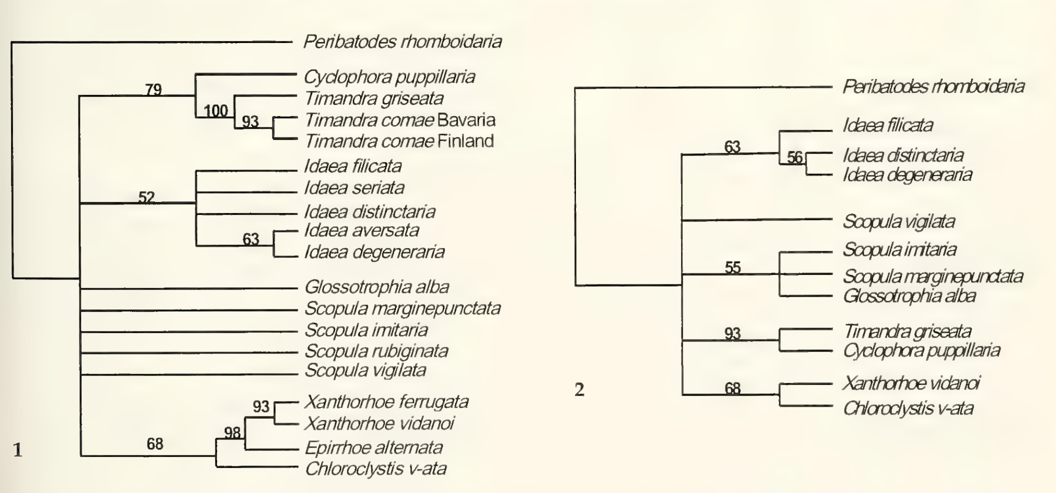


Fig. 1. Bootstrap 50 % majority-rule consensus tree for 19 Geometrid taxa using 135 informative sites of the mitochondrial ND1 gene (rooted with *Peribatodes rhomboidaria*). Settings for tree computation: Heuristic search, bootstrap with 100 replicates.

Fig. 2. Bootstrap 50 % majority-rule consensus tree of a reduced set of taxa using combined sequences of the mitochondrial ND1 gene and the 16S rRNA locus (102 parsimony informative characters, rooted with *Peribatodes rhomboidaria*). Settings for the analysis see fig. 1.

quent PCR amplified a fragment enclosing both genes (primer: ND-2, 5-ACATGATCTGAGT-TCAAACCGG, Vogler & De Salle 1993; ND-S, 5-TAGAATTAGAAGATCAACCAGC, Weller pers. comm.). Sequencing was done by an ABI 377 automated sequencer. Sequences were aligned to a respective sequence of *Bombyx mori* (GenBank ass. No. NC 002355), gaps and alignment ambiguities in the stretch of both sequences were excluded for analysis. The data-matrix contained 464 nucleotides (only ND1) or 779 bp in total (ND1 and 16S combined). Phylogenetic tree reconstruction was done by parsimony analysis using PAUP 3.1.1 with computation settings indicated in Figs. 1 and 2.

Tree reconstructions show close relations between tribes Timandrini *(Timandra griseata, T. comae)* and Cosymbini *(Cyclophora puppillaria)*, supported by relatively high bootstrap values (fig. 1, 2). The monophyly of the tribe Scopulini, strongly supported by morphological characters, is still unsupported by the used set of data. The examined Xanthorhoini species *(Xanthorhoe* spp., *Epirrhoe alternata)* show close relations to each other (bootstrap value 98; fig. 1). Certain affinities result as well between Xanthorhoini *(Xanthorhoe vidanoi)* and Eupitheciini *(Chloroclystis v-ata;* bootstrap value 68; figs. 1, 2). The relationships between the other tribes are not resolved by the present set of data.

We conclude that the preliminary results from our using the two mitochondrial genes ND1 and 16S are not yet satisfactory to tackle all details of subfamily and tribal relationships in the Geometridae by DNA sequencing. The implementation of more loci should contribute to a better resolution of the tree. Recently, Abraham et al. (2001) directed this way by running a molecular analysis with three gene fragments (ND1, D1- and D2- expansion elements of the nuclear 28S RNA) to reconstruct the phylogeny of Geometrid familiy with still more encouraging results.

This study, conducted at the Zoologische Staatssammlung München was integral to the "DNA-TAX project" that aims at establishing insect sequence databases in cooperation with the project "Inventory of Geometrid Moths of Europe" (A. Hausmann), both part of the "Entomological Data Information System (EDIS)" initiative, funded by the BMBF.

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New data on Anillina of the Oriental Region

(Insecta, Coleoptera, Carabidae, Bembidiini)

Pier Mauro Giachino

Giachino, P. M. (2001): New data on Anillini of the Oriental Region (Insecta, Coleoptera, Carabidae, Bembidiini). – Spixiana **24/3:** 203-206

The author describes the male morphological characters of *Argiloborus burckhardti* Giachino, 2001, confirming that this species belongs to the "*A. thailandicus* group" (sensu Giachino 2001). *Argiloborus riedeli*, spec. nov. from Salawati Island (Irian Jaya) is also described. It belongs to the "*A. huberi* group" (sensu Giachino 2001). The geographical distribution of the "*A. huberi* group" is also analysed.

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Introduction

This paper deals with the study of two specimens of *Argiloborus* Jeannel, 1937 (Coleoptera, Carabidae, Anillina) from Sumatra and New Guinea that were kindly sent to the author by Martin Baehr, of the Zoologische Staatsammlung of Munich (Germany). They are the until now unknown male of *Argiloborus burckhardti* Giachino, 2001, and a male of an undescribed species.

The specimens dealt with in this work are preserved in the following collections

MHNG: Muséum d'Histoire Naturelle, Genève

ZSM: Zoologische Staatsammlung, München

Argiloborus thailandicus species group

The "*thailandicus* species group" is characterized by the following morphological characters: sides of the pronotum distinctly denticulate in front of the basal angles, aedeagus with a sclerified apical blade, parameres bearing only one apical seta.

Argiloborus burckhardti Giachino, 2001

Fig. 1

Material examined: Holotype ♀, Sumatra: W Sum., # 21, Palopo Nat. Res. N., Bukittinggi, 900 m, 18-20.XI.1989, Agosti – Löbl – Burckhardt leg. (MHNG); 1♂, W Sumatra, Batang, Palupu, Bukittinggi, 1400-1500 m, 19.10.1991, leg. A. Riedel (ZSM).

Diagnosis of the ♂: The examination of the male specimen of *A. burckhardti* completely confirms its attribution to the "*Argiloborus thailandicus* group" (sensu Giachino 2001) both on the reasons of its external morphology and for the characters of the aedeagus.



Fig. 1. *Argiloborus burckhardti* Giachino, 2001. Aedeagus, lateral view. Scale: 0.1 mm.

The sizes of the male are as following: total length (from tip of mandibles to end of elytra) 1.15 mm. Pronotum slightly less transverse than in the female, with the ratio max. width/ max. length: 1.16; 1.27 in the female. Elytra a little narrower in the male (max. length/max. width ratio: 1.71; 1.57 in the female).

Protarsi pentamerous and not dilated in the male.

Aedeagus (Fig. 1) small, stocky, with a very developed apical blade, moderately sclerified and widely rounded. Internal sac provided, in the median area, with a large ondulated copulatory piece that continues with obvious muscular bundles slightly sclerified in the preapical area. Parameres stocky and short, rounded apically and bearing one seta; basal nodules very obvious and well chitinised.

Argiloborus huberi species group

The "*huberi* species group" is characterized by the following morphological characters: sides of pronotum distinctly denticulate in front of the basal angles, aedeagus lacking of the sclerified apical blade, parameres bearing two apical setae.

Argiloborus riedeli, spec. nov.

Fig. 2

Types. Holotype: ♀, Irian Jaya, Sorong-Pr. Salawati Isl., Kalobo, 10-30 m, 19-22.X.1996, leg. A. Riedel (ZSM).

Diagnosis. It is an *Argiloborus* with features in accordance with the genus (*sensu* Giachino 2001): presence of a labial tooth bearing two setae, elytra not emarginate apically, type B umbilicate series (sensu Jeannel 1963) (the large pores of the umbilicate series are the 2nd, 6th, and 9th ones) with the 7th pore slightly nearer to the 8th than to the 6th one.

A. riedeli, spec. nov. differs from all other known species of this group by the greater body size as may be seen hereafter:

A. javanicus Giachino, 2001: 0.79 mm.
A. roberti Giachino, 2001: 0.83-0.87 mm.
A. huberi Giachino, 2001: 0.91-0.97 mm.
A. indonesianus Giachino, 2001: 0.95 mm.
A. balinensis Giachino, 2001: 1.08 mm.
A. riedeli, spec. nov.: 1.22 mm.

Description of the ♀ holotypus

Total length (from tip of mandibles to apex of elytra) 1.22 mm. Body elongated, depigmented, yellow testaceous, with elytra and abdomen of the same colour; integument opaque, obvious microsculpture, covered with a sparse and short pubescence (Fig. 2).

Head robust, hypertrophic, narrower than pronotum, anophthalmous. Antennae very short, thickened, clearly moniliform starting from the third antennomere, not reaching the base of pronotum when stretched backwards. Anterior margin of the epistome subrectilinear. Two supraorbital setae on each side, far from each other and placed on rows neatly converging backwards, plus a series of dispersed supranumerary setae not symmetrical between each other. Mandibles short, simple, without dorsal crests; labrum provided with 6 anterior marginal setae; labium transverse, articulated, bearing one obvious tooth on the anterior margin, epilobes poorly developed; labial tooth bearing two setae. Maxillary palps with the penultimate article very big, ovoidal elongated, and the last one tiny, poorly differentiated.

Pronotum slightly transverse (max. width/max. length ratio = 1.22), enlarged in front, narrowed at the base, with maximum width at about the anterior third. Sides poorly arcuated anteriorly, slightly sinuate in front of the base; clearly denticulate in front of the basal angles. Anterior angles widely rounded, not protruding; basal angles right and marked. Disk scarcely convex, with a short and sparse pubescence; median groove shallow, hardly marked. Marginal groove very wide and flat, enlarged near the base; anterior marginal setae inserted inside the marginal groove, at about the anterior sixth; basal setae at the back angles.

Elytra ovoidal, elongated, not emarginate preapically, without traces of striae. Disk poorly convex; integument opaque, with obvious microsculpture and short, sparse and erect pubescence. Humeri rounded, but well marked; post-humeral margin denticulate, with a distinct crenulation until the apical third. Marginal groove wide and obvious until the 9th pore of the umbilicate series.

Fig. 2. *Argiloborus riedeli*, spec. nov. ♀ Holotype. Habitus. Scale: 0.1 mm.

Chaetotaxis: basal umbilicate pore large, foveate. Type B umbilicate series (the big pores of the umbilicate series are the 2nd, 6th, and 9th ones (sensu Jeannel 1963)); the first three pores of the humeral group are almost at the same distance from each other, the 4th pore is much farther and placed almost in the middle between the 3rd and the 5th ones; the 5th pore is at about the apical third of the elytron and slightly on the elytral disk, the 6th one is nearer to the 5th; the 7th, 8th, and 9th ones are at about the same distance from each other, the 8th one slightly on the elytral disk and a little nearer to the 9th; the 7th one is slightly nearer to the 8th than to the 6th. Discal pores missing.

Legs short and thickset; anterior tarsi pentamerous in the female.

Male unknown.

Derivatio nominis: This new species is dedicated to its collector Alexander Riedel of Stuttgart.

Distribution, ecology: *Argiloborus riedeli*, spec. nov. is known at present only from the type locality: Kalobo, on Salawati Island, at the western end of Irian Jaya. This new species was collected in October at the very low height of only 10-30 m a.s.l.



Fig. 3. Distribution map of the *Argiloborus* of the "*huberi* species group".

Remarks

The *Argiloborus* species described recently by Giachino (2001), and in particular the one dealt with in this paper, have a peculiar zoogeographical meaning and further enlarge the presently known distribution area of the whole phyletic lineage of *Argiloborus*. The genus *Argiloborus*, in particular, has, as far as we now know, a very wide distribution that, starting from Madagascar, going through the Mauritius and Seychelles Isles, Ceylon and southern India, reaches the Malay peninsula and the Islands of Sumatra, Java, Bali and Salawati, trespassing the Weber line, that marks, between the Islands of Bali and Lombok, the border between the Oriental Region and the Australian Region for several groups of living organisms (Jeannel 1942) (Fig. 3). Presently, no Anillina are known from Borneo, Celebes and New Guinea (if we exclude the new species now known from Salawati Island), whereas in New Caledonia there is *Orthotyphlus* Zaballos & Mateu, 1998, of the *Zeanillus* phyletic series (sensu Jeannel 1963 and Moore 1980).

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I am very grateful to Dr. Martin Baehr of Zoologische Staatsammlung of Munich for having allowed me to study the precious material dealt with in this work, and to Prof. Achille Casale of the Dipartimento di Zoologia e Antropologia Biologica of the University of Sassari for his critical suggestions to the manuscript.

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Revision der bisher zu *Iselix* Förster gestellten westpaläarktischen Arten von *Phygadeuon* Gravenhorst

(Insecta, Hymenoptera, Ichneumonidae, Cryptinae)

Klaus Horstmann

Horstmann, K. (2001): Revision of those western Palearctic species of *Phygadeuon* Gravenhorst, which were hitherto placed to *Iselix* Förster (Insecta, Hymenoptera, Ichneumonidae, Cryptinae). – Spixiana **24/3:** 207-229

Those western Palearctic species of *Phygadeuon* Gravenhorst, which were hitherto placed to *Iselix* Förster by some authors, are arranged in seven species groups, revised and described. Eight species from central and north-western Europe are described as new. A key is provided for the females of 24 species. Lectotypes are designated for *Ischnocryptus cubiceps* Smits van Burgst and *Phygadeuon thomsoni* Roman, in order to preserve stability of nomenclature. The following synonymies are newly indicated: *P. geniculatus* Kriechbaumer, syn. *Platylabus meuseli* Lange; *Phygadeuon clotho* Kriechbaumer, syn. *P. grossae* Horstmann; *P. atropos* Kriechbaumer, syn. *Ischnocryptus atropos* (Kriechbaumer) var. *rufifemur* Seyrig. Three species have been reared from their hosts, they are endoparasitoids and koinobionts.

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Einleitung

Phygadeuon Gravenhorst ist eine der artenreichsten und gleichzeitig am wenigsten bekannten Gattungen der Ichneumonidae. Über die Arten der Westpaläarktis sind in den letzten Jahrzehnten nur Teilrevisionen kleiner Artengruppen erschienen (Horstmann 1967, 1993). Hier wird eine Revision der Arten vorgelegt, die traditionell zu *Iselix* Förster gestellt worden sind. Über den Status dieses Taxons gehen die Meinungen auseinander: Perkins (1962: 432) und Townes (1970: 103) stellen *Iselix* als Synonym zu *Phygadeuon*, Townes et al. (1965: 147) und Hellén (1967) dagegen führen *Iselix* als eine von *Phygadeuon* getrennte Gattung. Derzeit behandelt die Mehrzahl der Autoren *Iselix* als Untergattung oder als Synonym von *Phygadeuon* (Aubert 1974: 268 f., Yu & Horstmann 1997: 383). Eine Klärung der anstehenden Fragen wird hier nicht angestrebt; sie kann nur in einer umfassenden Revision von *Phygadeuon* erfolgen. Auch in Bezug auf den Umfang von *Iselix* folgt die vorliegende Arbeit der Auffassung früherer Autoren. Dagegen werden die bisher zu *Iselix* gestellten Arten nach der Form des Legebohrers in sieben Artengruppen aufgeteilt. Auf einige der gefundenen Unterschiede hat bereits Aubert (1974: 269) aufmerksam gemacht. Die Artengruppen *austriacus* (Gravenhorst), *geniculatus* Kriechbaumer und *ponojensis* (Hellén) sind vermutlich weder untereinander noch mit den anderen Arten nah verwandt. Die anderen Artengruppen, einzeln (Artengruppe *nitidus* Gravenhorst) oder zu mehreren gemeinsam (Artengruppen *brevitarsis* Thomson, *hercynicus* Gravenhorst und *lachesis* Kriechbaumer), können vielleicht später einmal in den Rang von Untergattungen gehoben werden, wenn nähere Kenntnisse zur Lebensweise der Arten vorliegen.

Das Ziel der vorliegenden Arbeit ist es, die Determination der europäischen und insbesondere der mitteleuropäischen Arten zu erleichtern. Zum einen haben in den letzten Jahrzehnten mehrere Ento-

mologen *Iselix*-Arten aus *Cheilosia*-Arten (Diptera, Syrphidae) gezüchtet, und die Determination der Parasiten war ohne eine Revision nicht möglich. Zum anderen befindet sich in der Zoologischen Staatssammlung (München) ein umfangreiches Material dieser Artengruppe, teilweise aus der Sammlung Kriechbaumer (einschließlich einiger Typen), vor allem aber aus der Sammlung Erich Bauer, der in seinen Hauptsammelgebieten Harz und Oberbayern (siehe Horstmann 1983) viele *Iselix*-Arten gefangen hat. Daneben wurde Material aus einigen anderen Museen revidiert (vgl. unten). Die Revision berücksichtigt alle als Weibchen beschriebenen westpaläarktischen Arten, die von anderen Autoren zu *Iselix* gestellt worden sind, und enthält dazu Neubeschreibungen von acht Arten. Sie ist aber keinesfalls umfassend. Sicherlich existieren auch in Mitteleuropa noch weitere unbeschriebene Arten.

Männchen von *Phygadeuon* sind derzeit in der Regel undeterminierbar. Alle nur im männlichen Geschlecht bekannten Arten werden hier nicht behandelt, und für Männchen kann auch kein Bestimmungsschlüssel entworfen werden. Möglicherweise bleiben deshalb einige Synonymien unerkannt. Auch Weibchen können nur sicher determiniert werden, wenn sie vollständig erhalten sind; insbesondere muss ein Fühler und der Legebohrer vorhanden sein. Die Identifikation einiger defekter Typen war deshalb schwierig, oder sie bleibt unsicher.

Angaben über die Lebensweise liegen nur für drei Arten der Artengruppe *hercynicus* Gravenhorst vor: Sie parasitieren an Arten von *Cheilosia* Meigen (Diptera, Syrphidae), deren Larven an *Carduus*- oder *Cirsium*-Arten leben.

Das untersuchte Material entstammt folgenden Museen und Sammlungen:

DEIE: Deutsches Entomologisches Institut, Eberswalde
FRI: Sammlung Frilli, Istituto de Defesa delle Piante, Udine
HO: Sammlung Horstmann, Lehrstuhl Zoologie III, Biozentrum, Würzburg
LEW: Laboratorium voor Entomologie, Wageningen
MHNP: Muséum National d'Histoire Naturelle, Paris
MPW: Muzeum Przyrodnicze, Wroclaw
MZL Musée Zoologique, Lausanne
NHML: Natural History Museum, London
NMSE: National Museums of Scotland, Edinburgh
NMW: Naturhistorisches Museum, Wien
NRS: Naturhistoriska Riksmuseet, Stockholm
NSF: Naturmuseum Senckenberg, Frankfurt
SMNS: Staatliches Museum für Naturkunde, Stuttgart
STU: Sammlung Stuke, AG Evolutionsbiologie der Universität, Bremen
ZIL: Zoologiska Institutionen, Lund
ZMH: Zoological Museum, Helsinki
ZSM: Zoologische Staatssammlung, München

Bestimmungsschlüssel für die Weibchen

1. Apicalrand des Clypeus median nicht gezähnt, sondern nur wenig vorgerundet, zwei Zähne subapical als Oberflächenstruktur erkennbar (Abb. 12); Bohrer dorsal vor dem Nodus mit einer rundlichen Vorwölbung (Abb. 39); Bohrerklappen 1,5 mal so lang wie das erste Gastertergit (Artengruppe *lachesis* Kriechbaumer) .... *lachesis* Kriechbaumer, 1892

– Apicalrand des Clypeus median deutlich gezähnt, mit einem einzelnen Zahn (Abb. 11), einem Doppelzahn (Abb. 9) oder zwei deutlich getrennten Zähnen (Abb. 10); Bohrer dorsal vor dem Nodus gerade (Abb. 32-38 und 42-43) oder mit einem zweiten Zahn (Abb. 40-41); Bohrerlänge unterschiedlich .... 2.

2. Bohrer dorsal am Nodus mit einem zahnartigen Vorsprung und davor mit einem weiteren deutlichen Zahn (Abb. 40-41)*; Bohrerklappen 0,6-1,3 mal so lang wie das erste Gastertergit (Artengruppe *nitidus* Gravenhorst) .... 3.

* Bei *P. habermehli* liegt der zweite Zahn relativ weit proximal und ist nur bei frei sichtbaren Bohrerstiletten zu erkennen.

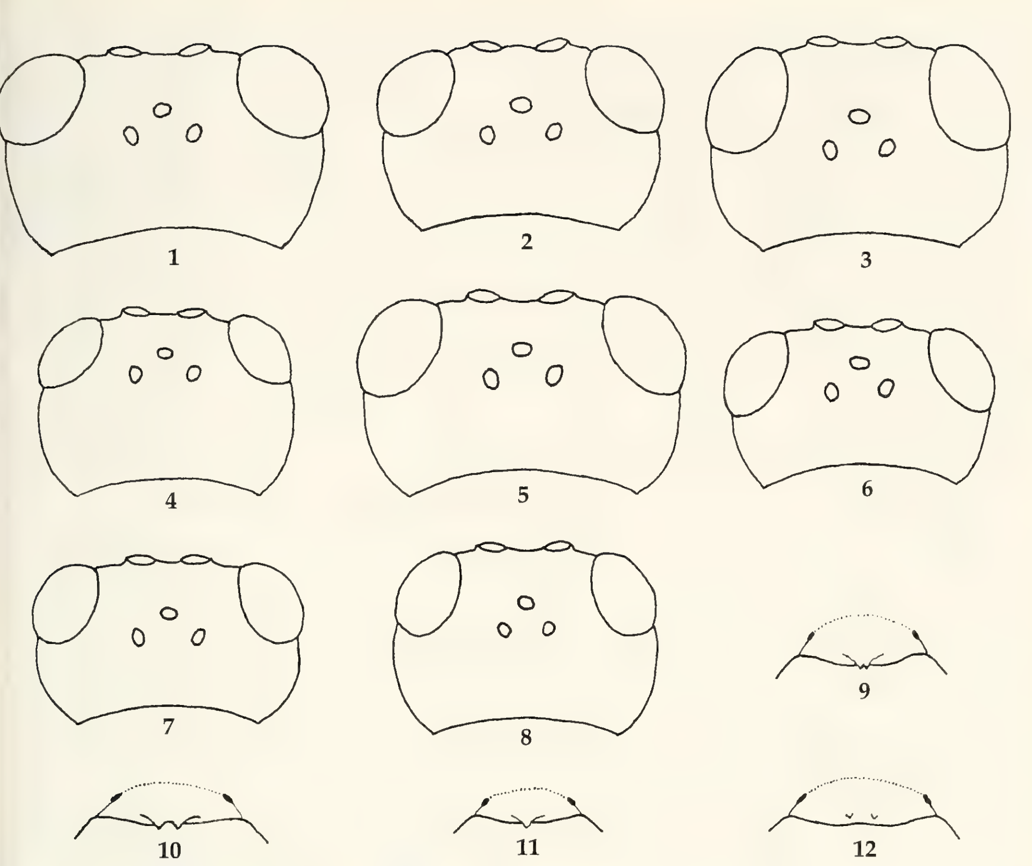


Abb. 1-8. Dorsalansicht des Kopfes. **1.** *Phygadeuon bavaricus.* **2.** *P. fraternae.* **3.** *P. praealpinus.* **4.** *P. unidentatus.* **5.** *P. laevipleuris.* **6.** *P. nigrifemur.* **7.** *P. atricolor.* **8.** *P. macrocephalus.*
Abb. 9-12. Clypeus. **9.** *P. fraternae.* **10.** *P. praealpinus.* **11.** *P. unidentatus.* **12.** *P. lachesis.*

– Bohrer dorsal am Nodus gezähnt oder ungezähnt, davor ohne weiteren Zahn (Abb. 32-38 und 42-43); Bohrerlänge unterschiedlich .... 8.

3. Bohrerklappen 0,6-0,7 mal so lang wie das erste Gastertergit; viertes Fühlerglied etwa zweimal so lang wie breit .... *habermehli* Roman, 1930

– Bohrerklappen 0,9-1,3 mal so lang wie das erste Gastertergit; viertes Fühlerglied bei mehreren Arten 2,3-2,5 mal so lang wie breit .... 4.

4. Schläfen 1,1 mal so breit wie die Augen (von oben gesehen), direkt hinter den Augen etwas erweitert; Wangenraum 0,9 mal so breit wie die Mandibelbasis; Clypeus dorsal neben der Punktierung etwas quergerunzelt; Hinterfemora 3,6 mal so lang wie hoch .... *forticornis* Kriechbaumer, 1892

– Schläfen höchstens so breit wie die Augen, direkt hinter den Augen parallel oder etwas verengt; Wangenraum höchstens 0,8 mal so breit wie die Mandibelbasis; Clypeus dorsal neben der Punktierung nicht quergerunzelt; Hinterfemora teilweise gedrungener .... 5.

5. Viertes Fühlerglied knapp zweimal so lang wie breit; Hinterfemora 2,9-3,1 mal so lang wie hoch .... *atropos* Kriechbaumer, 1892

– Viertes Fühlerglied 2,3-2,5 mal so lang wie breit; Hinterfemora 3,5-3,7 mal so lang wie hoch ... 6.

6. Hinterfemora überwiegend oder ganz schwarz; Bohrerklappen 1,3 mal so lang wie das erste Gastertergit .... *nigrifemur*, spec. nov.
– Hinterfemora rotbraun; Bohrerklappen 0,9-1,0 mal so lang wie das erste Gastertergit .... 7.

7. Mesopleuren im Zentrum auf einer größeren Stelle unpunktiert; Area superomedia 0,8-1,0 mal so lang wie breit (Abb. 28) .... *laevipleuris*, spec. nov.
– Mesopleuren im Zentrum überall zerstreut punktiert, Punkte 0,3-0,5 mal so breit wie die Zwischenräume; Area superomedia 0,5-0,7 mal so lang wie breit .... *nitidus* Gravenhorst, 1829

8. Dorsale Kante des Bohrers am Nodus mit einer kleinen Runzel oder einem kleinen Einschnitt, aber dort nicht deutlich gewinkelt, sondern gerade oder gleichmäßig gerundet (Abb. 32-33 und 35-38) .... 9.
– Dorsale Kante des Bohrers am Nodus deutlich gewinkelt, distal nach ventral abgeknickt (Abb. 34 und 42-43) .... 20.

9. Bohrerspitze deutlich aufgebogen (Abb. 33); Bohrerklappen 1,1-1,2 mal so lang wie das erste Gastertergit (Artengruppe *brevitarsis* Thomson) .... 10.
– Bohrerspitze etwa gerade (Abb. 32 und 35-38); Bohrerklappen häufig länger .... 11.

10. Schläfen direkt hinter den Augen parallel; Femora hell rotbraun .... *brevitarsis* Thomson, 1884
– Schläfen direkt hinter den Augen erweitert; Femora der Vorder- und Mittelbeine überwiegend, die der Hinterbeine ganz schwarz .... *tunetanus* Horstmann & Yu, 1999

11. Fühler 23-24-gliedrig; Bohrerspitze hinter dem Nodus kurz, die dorsale Kante wenig nach ventral gerundet (Abb. 32); Bohrerklappen 1,7 mal so lang wie das erste Gastertergit (Artengruppe *austriacus* (Gravenhorst)) .... *austriacus* (Gravenhorst, 1829)
– Fühler 19-22-gliedrig; Bohrer insgesamt stilettförmig, Spitze hinter dem Nodus lang, die dorsale Kante etwa gerade (Abb. 35-38); Bohrerklappen 0,6-1,4 mal so lang wie das erste Gastertergit (Artengruppe *hercynicus* Gravenhorst) .... 12.

12. Schläfen 1,4 mal so breit wie die Augen (Abb. 4); Clypeus apical mit einem spitzen Zahn (Abb. 11); Area superomedia 1,2 mal so lang wie breit (Abb. 27) .... *unidentatus*, spec. nov.
– Schläfen häufig schmäler; Clypeus apical mit zwei Zähnen (Abb. 9-10); Area superomedia höchstens so lang wie breit .... 13.

13. Viertes Fühlerglied 3,3-3,5 mal so lang wie breit (Abb. 15); Hinterfemora 3,8-3,9 mal so lang wie hoch; Bohrerklappen 0,6-0,7 mal so lang wie das erste Gastertergit .... *praealpinus*, spec. nov.
– Viertes Fühlerglied höchstens 2,6 mal so lang wie breit; Hinterfemora 2,9-3,7 mal so lang wie hoch; Bohrerklappen 0,8-1,4 mal so lang wie das erste Gastertergit .... 14.

14. Hinterfemora schwarz oder dunkelbraun gezeichnet .... 15.
– Hinterfemora vollständig hell rotbraun .... 17.

15. Schläfen 1,3-1,4 mal so breit wie die Augen (von oben gesehen); viertes Fühlerglied 2,4-2,6 mal so lang wie breit; Bohrerklappen 1,3-1,4 mal so lang wie die erste Gastertergit .... *clotho* Kriechbaumer, 1892
– Schläfen 1,0-1,3 mal so lang wie die Augen; viertes Fühlerglied 2,0-2,3 mal so lang wie breit; Bohrerklappen 0,8-1,2 mal so lang wie das erste Gastertergit .... 16.

16. Schläfen 1,1-1,3 mal so breit wie die Augen (Abb. 2); Hinterfemora 2,9-3,2 mal so lang wie hoch; Bohrerklappen 1,1-1,2 mal so lang wie das erste Gastertergit .... *fraternae*, spec. nov.
– Schläfen 1,0-1,1 mal so breit wie die Augen; Hinterfemora 3,3-3,6 mal so lang wie hoch; Bohrerklappen 0,8-1,0 mal so lang wie das erste Gastertergit .... *hercynicus* Gravenhorst, 1829, var.

17. Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; zweites Gastertergit 0,7-0,8 mal so lang wie breit .... 18.
– Scheitel nach dorsal zumindest etwas über das Niveau der Ocellen vorragend; zweites Gastertergit 1,0-1,2 mal so lang wie breit .... 19.

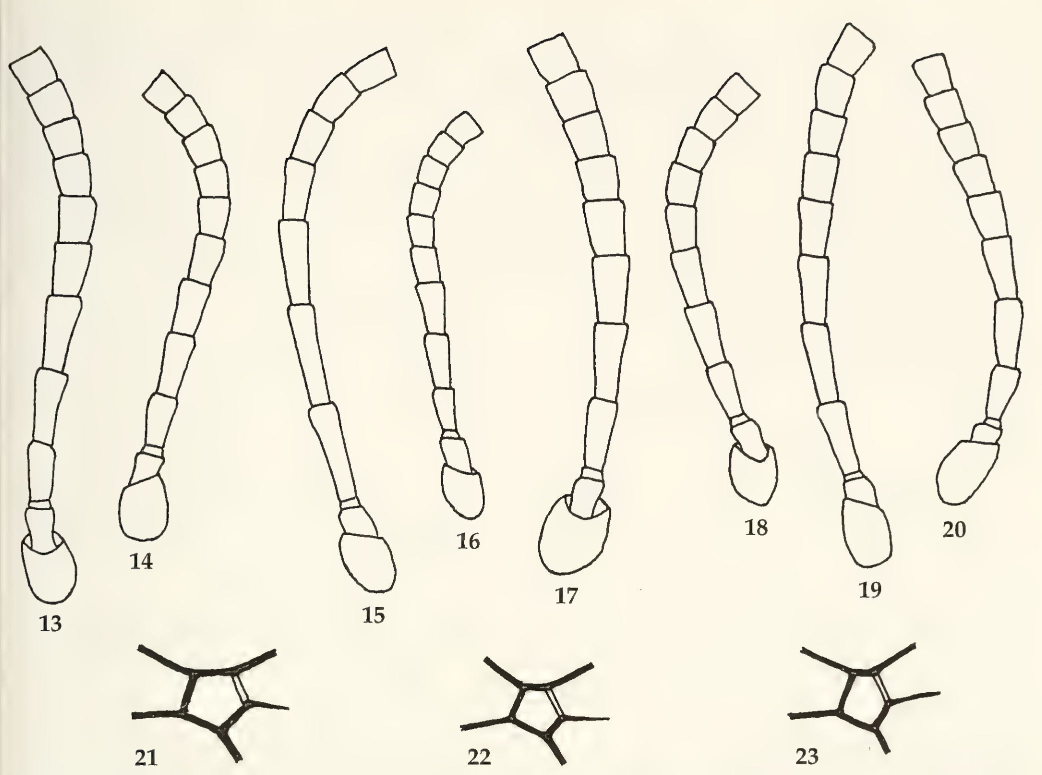


Abb. 13-20. Fühlerbasis. **13.** *Phygadeuon bavaricus.* **14.** *P. fraternae.* **15.** *P. praealpinus.* **16.** *P. unidentatus.* **17.** *P. laevipleuris.* **18.** *P. nigrifemur.* **19.** *P. atricolor.* **20.** *P. macrocephalus.*
Abb. 21-23. Areola des Vorderflügels. **21.** *P. bavaricus.* **22.** *P. fraternae.* **23.** *P. atricolor.*

18. Schläfen direkt hinter den Augen deutlich etwas verengt; Hinterfemora 3,2-3,4 mal so lang wie hoch; zweites Gastertergit 0,7 mal so lang wie breit .... *chilosiae* Horstmann, 1975
– Schläfen direkt hinter den Augen parallel; Hinterfemora 3,1-3,2 mal so lang wie hoch; zweites Gastertergit 0,8 mal so lang wie breit .... *thomsoni* Roman, 1925

19. Viertes Fühlerglied 2,3-2,4 mal so lang wie breit; Hinterfemora 3,1-3,3 mal so lang wie hoch .... *bavaricus*, spec. nov.
– viertes Fühlerglied 2,0 mal so lang wie breit; Hinterfemora 3,6-3,7 mal so lang wie hoch .... *hercynicus* Gravenhorst, 1829

20. Zweites Gastertergit 1,0-1,3 mal so lang wie breit, stellenweise fein gekörnelt und/oder fein längsgestreift; Bohrerklappen 0,5-0,7 mal so lang wie das erste Gastertergit (Artengruppe *geniculatus* Kriechbaumer) .... 21.
– Zweites Gastertergit etwa 0,7 mal so lang wie breit, glatt oder stellenweise mit sehr feinen Haarpunkten; Bohrerklappen 0,8-1,6 mal so lang wie das erste Gastertergit (Artengruppe *ponojensis* (Hellén)) .... 22.

21. Schläfen direkt hinter den Augen etwa parallel; Punkte auf der Stirn stellenweise breiter als die Zwischenräume; Körperlänge 6-8 mm .... *geniculatus* Kriechbaumer, 1892
– Schläfen direkt hinter den Augen deutlich verengt; Punkte auf der Stirn höchstens so breit wie die Zwischenräume; Körperlänge 5 mm .... *meridionator* (Aubert, 1960)

22. Bohrerklappen 0,8-1,0 mal so lang wie das erste Gastertergit .... 23.
– Bohrerklappen 1,3-1,6 mal so lang wie das erste Gastertergit .... 24.

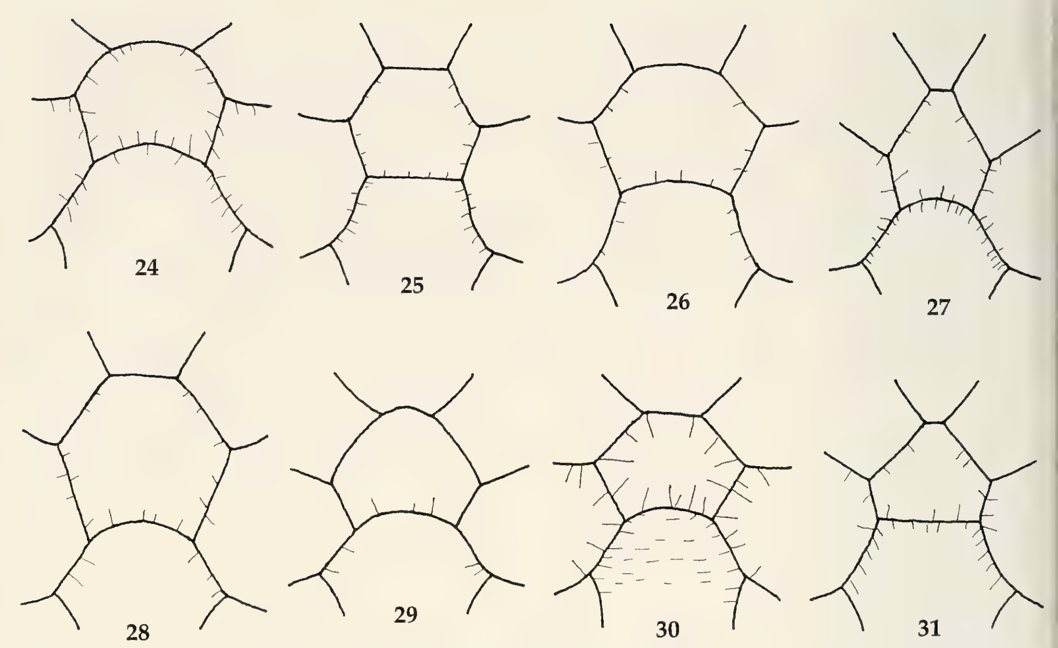


Abb. 24-31. Area superomedia. **24.** *Phygadeuon bavaricus.* **25.** *P. fraternae.* **26.** *P. praealpinus.* **27.** *P. unidentatus.* **28.** *P. laevipleuris.* **29.** *P. nigrifemur.* **30.** *P. atricolor.* **31.** *P. macrocephalus.*

23. Hinterfemora überwiegend schwarzbraun; Area superomedia 0,7 mal so lang wie breit; Bohrerklappen 0,8 mal so lang wie das erste Gastertergit .... *camargator* Aubert, 1982
– Hinterfemora hell rotbraun; Area superomedia 1,0-1,2 mal so lang wie breit; Bohrerklappen so lang wie das erste Gastertergit .... *oporinus* Horstmann & Yu, 1999

24. Schläfen 1,2 mal so breit wie die Augen (von oben gesehen) (Abb. 8); Scheitel nach dorsal etwas über das Niveau der Ocellen vorragend; viertes Fühlerglied 2,2 mal so lang wie breit; Hinterfemora 2,8 mal so lang wie hoch .... *macrocephalus*, spec. nov.
– Schläfen höchstens 1,1 mal so breit wie die Augen; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; viertes Fühlerglied 2,4-2,7 mal so lang wie breit; Hinterfemora 3,4-3,9 mal so lang wie hoch .... 25.

25. Viertes Fühlerglied 2,7 mal so lang wie breit; Geißel ganz schwarz; Hinterfemora 3,9 mal so lang wie hoch .... *atricolor*, spec. nov.
– viertes Fühlerglied 2,4-2,5 mal so lang wie breit; Geißelbasis hell rotbraun; Hinterfemora 3,4 mal so lang wie hoch .... *ponojensis* (Hellén, 1967)

Artengruppe *austriacus* (Gravenhorst)

Phygadeuon austriacus (Gravenhorst, 1829)
Fig. 32

Cryptus austriacus Gravenhorst, 1829: 573 (Frilli 1978: 157).
Iselix elfvingi Hellén, 1967: 91 (Horstmann 1990: 183).

Beschreibung

♀: Schläfen 1,1 mal so breit wie die Augen, direkt hinter den Augen ein wenig erweitert, fein und zerstreut punktiert; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Clypeus basal

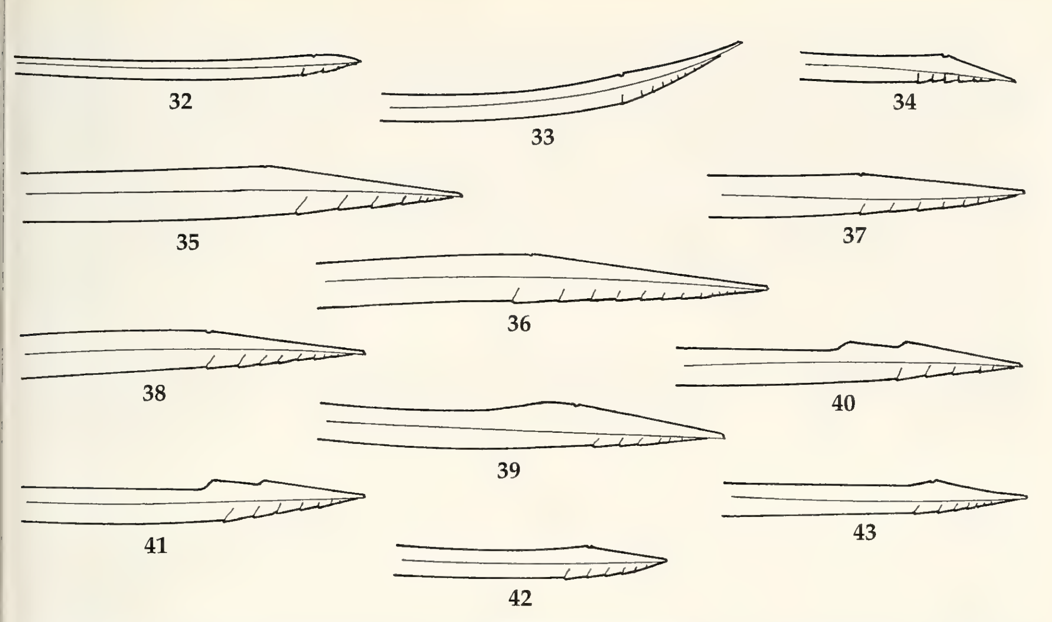


Abb. 32-43. Lateralansicht der Bohrerspitze. **32.** *Phygadeuon austriacus*. **33.** *P. brevitarsis*. **34.** *P. geniculatus*. **35.** *P. bavaricus*. **36.** *P. fraternae*. **37.** *P. praealpinus*. **38.** *P. unidentatus*. **39.** *P. lachesis*. **40.** *P. laevipleuris*. **41.** *P. nigrifemur*. **42.** *P. atricolor*. **43.** *P. macrocephalus*.

deutlich und mäßig dicht punktiert, apical mit zwei deutlich getrennten spitzen Zähnen; Wangenraum 0,8 mal so breit wie die Mandibelbasis; Fühler 24-gliedrig, das vierte Glied 3,0 mal so lang wie breit, Distalhälfte der Geißel nicht deutlich erweitert, Glieder im distalen Drittel der Geißel 1,2-1,3 mal so lang wie breit; Mesopleuren außerhalb des Speculums fein und sehr zerstreut punktiert; Hinterfemora 3,5-3,8 mal so lang wie hoch; Area superomedia 0,7 mal so lang wie breit; zweites Gastertergit glatt, 0,9 mal so lang wie breit; Bohrer sehr schlank, distal wenig aufgebogen, ohne deutlichen Nodus, ventral mit feinen Zahnleisten (Abb. 32), Bohrerklappen 1,7 mal so lang wie das erste Gastertergit; Körperlänge etwa 7 mm; Fühler und Coxen schwarz; Hinterschenkel rotbraun; zweites bis fünftes Gastertergit hell rotbraun, die folgenden verdunkelt.

Material: 2♀♀, Kuopio/FIN (ZMH), Österreich (Coll. Gravenhorst/MPW).

Variation. 1♀ von Trifels/Annweiler/Rheinland-Pfalz/D (NSF) gehört möglicherweise zu dieser Art, weicht aber durch folgende Merkmale ab: Schläfen deutlich und mäßig dicht punktiert, Fühler 23-gliedrig; Hinterfemora proximal bis über die Mitte schwarz. Dem ♀ fehlen allerdings der Bohrer und die Bohrerklappen.

Artengruppe *brevitarsis* Thomson

Phygadeuon brevitarsis Thomson, 1884
Fig. 33

Phygadeuon brevitarsis Thomson, 1884: 959 (Frilli 1973: 96 f.).

Roman (1925: 11) hat diese Art fälschlich mit *P. hercynicus* Gravenhorst synonymisiert.

Beschreibung

♀: Schläfen so breit wie die Augen (von dorsal gesehen), direkt hinter den Augen ein kurzes Stück parallel, fein und zerstreut bis sehr zerstreut punktiert; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Clypeus basal deutlich punktiert, apical mit zwei getrennten spitzen Zähnen;

Wangenraum 0,6-0,7 mal so breit wie die Mandibelbasis; Fühler 21-22-gliedrig, das vierte Glied 2,3-2,4 mal so lang wie breit, Distalhälfte der Geißel etwas keulenförmig erweitert, das breiteste Glied etwa 0,9 mal so lang wie breit; Mesopleuren außerhalb des Speculums deutlich zerstreut bis sehr zerstreut punktiert, an kleinen Stellen unpunktiert; Hinterfemora 2,8-3,0 mal so lang wie hoch, Area superomedia 0,7-0,9 mal so lang wie breit; zweites Gastertergit glatt, 0,7-0,9 mal so lang wie breit; Bohrer schlank, distal deutlich aufgebogen, dorsal mit einem sehr schwach angedeuteten Nodus, ventral mit feinen Zahnleisten (Abb. 33); Bohrerklappen 1,1-1,2 mal so lang wie das erste Gastertergit; Körperlänge 5-6 mm; drittes bis fünftes Fühlerglied rotbraun; Coxen schwarz; Hinterfemora rotbraun; Postpetiolus caudal-median, das zweite, dritte und die Basis des vierten Gastertergits rotbraun, die folgenden dunkelbraun, caudal gelb gerandet.

Material: 21♀♀, Emo Park/Leix/IRL, Dulverton/Somerset/GB, Newton Abbot/Devon/GB, Henstead/Suffolk/GB (alle NHML); Scåne/S (Coll. Thomson/ZIL), Ringselle/Örebro/S (NRS), Harzburg/Niedersachsen/D, Elmau/Bayern/D, Garmisch/Bayern/D (alle ZSM); Weibersbrunn/Spessart/Bayern/D (HO), Podcetrtek/Slowenien (SZM).

Phygadeuon tunetanus Horstmann & Yu, 1999

Ischnocryptus cubiceps Smits van Burgst, 1913: 312 f. – praeocc. in *Phygadeuon* durch *Phygadeuon cubiceps* Thomson, 1884 – Lectotypus (♀) hiermit festgelegt: "♀", "Smits v. Burgst Omgev. Tunis 3/4 1911" (Coll. Smits van Burgst/LEW).

Phygadeuon tunetanus Horstmann & Yu, 1999: 80 – nom. nov. für *Ischnocryptus cubiceps* Smits van Burgst, 1913.

Beschreibung

♀: Schläfen 1,2 mal so breit wie die Augen, direkt hinter den Augen ein kurzes Stück erweitert, fein und sehr zerstreut punktiert; Clypeus basal kräftig zerstreut punktiert, apical mit zwei kleinen deutlich getrennten Zähnen; Wangenraum 0,7 mal so breit wie die Mandibelbasis; Fühler 21-gliedrig, das vierte Glied 2,3 mal so lang wie breit, Distalhälfte der Geißel etwas keulenförmig erweitert, das breiteste Glied knapp so lang wie breit; Mesopleuren außerhalb des Speculums kräftig zerstreut punktiert; Hinterfemora 3,1 mal so lang wie hoch; Area superomedia 0,8 mal so lang wie breit; zweites Gastertergit glatt, 0,8 mal so lang wie breit; Bohrer wie bei *P. brevitarsis*, Bohrerklappen 1,2 mal so lang wie das erste Gastertergit; Körperlänge 6 mm; drittes bis fünftes Fühlerglied gelbbraun; Coxen schwarz; Hinterfemora fast ganz schwarzbraun; zweites bis fünftes Gastertergit hell rotbraun.

Material: 4♀♀, Tunis/Tunesien (LEW).

Artengruppe *geniculatus* Kriechbaumer

Phygadeuon geniculatus Kriechbaumer, 1892
Fig. 34

Phygadeuon (Ischnocryptus) geniculatus Kriechbaumer, 1892: 343 (Aubert 1974: 269). Von den drei Syntypen dieses Taxons gehören der Lectotypus (♀) von Hochstätt bei Rosenheim und ein Paralectotypus (♀) von Hesselohe/München zu der hier behandelten Art, ein weiterer Paralectotypus (♀) von Hohenschwangau dagegen zu *P. meridionator* (alle ZSM). Die drei von Aubert (l. c.) erwähnten Exemplare vom Tegernsee (ZSM) haben keinen Typenstatus.

Platylabus meuseli Lange, 1911: 540 f. (syn. nov.) (Oehlke & Horstmann 1987: 151).

Beschreibung

♀: Schläfen etwa so breit wie die Augen, direkt hinter den Augen parallel, sehr wenig erweitert oder sehr wenig verengt, kräftig und mäßig dicht bis zerstreut punktiert; Dorsalhälfte der Stirn und Scheitel mäßig dicht punktiert, Punkte mindestens so breit wie die Zwischenräume; Scheitel nach dorsal etwas über das Niveau der Ocellen vorragend; Clypeus basal deutlich punktiert, teilweise mit feinen Querrunzeln, apical mit zwei deutlich getrennten spitzen Zähnen; Wangenraum 0,6-0,7 mal so breit wie die Mandibelbasis; Fühler 23-26-gliedrig, das vierte Glied 3,0-3,2 mal so lang wie breit,

Distalhälfte der Geißel nicht keulenförmig erweitert, Glieder im distalen Drittel der Geißel 1,1-1,2 mal so lang wie breit; Mesopleuren außerhalb des Speculums deutlich und mäßig dicht punktiert, an den Rändern stellenweise etwas längsgerunzelt; Hinterfemora 3,7-3,9 mal so lang wie hoch; Area superomedia 0,6-0,8 mal so lang wie breit; zweites Gastertergit 1,0-1,2 mal so lang wie breit, frontal bis über die Mitte fein längsgestreift oder mit Körnelreihen (variabel); Bohrer gerade, mit deutlichem Nodus und deutlichen Zahnleisten (Abb. 34), Bohrerklappen 0,5-0,6 mal so lang wie das erste Gastertergit: Körperlänge 6-8 mm; Geißelbasis hell rotbraun; Coxen rotbraun, basal unterschiedlich ausgedehnt verdunkelt; Hinterfemora rotbraun, distal schmal verdunkelt; zweites bis drittes oder viertes Gastertergit rotbraun, die folgenden braun gezeichnet, caudal gelb gerandet, selten auch das fünfte Tergit ganz rotbraun.

Material: 17♀♀, Großbritannien (aus Coll. Morley) (NHML); Goslar/Niedersachsen/D (ZSM); Düsseldorf/Nordrhein-Westfalen/D, Worms/Rheinland-Pfalz/D (beide NSF); Garmisch/Bayern/D, München/Bayern/D, Rosenheim/Bayern/D, Tegernsee/Bayern/D (alle ZSM); Oberstdorf/Bayern/D, Grindelwald/Bern/CH (beide NHML); Leutasch/Tirol/A (ZSM); Dundovici/Kroatien (DEIE).

Phygadeuon meridionator (Aubert, 1960), stat. nov.

Iselix geniculatus (Kriechbaumer) *meridionator* Aubert, 1960: 652.

Beschreibung

♀: Schläfen 0,8 mal so breit wie die Augen, direkt hinter den Augen deutlich verengt, fein und zerstreut punktiert; Dorsalhälfte der Stirn und Scheitel fein und zerstreut punktiert, Punkte an vielen Stellen schmäler als die Zwischenräume (variabel); Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Clypeus basal deutlich zerstreut punktiert, ohne Querrunzeln, apical mit zwei deutlich getrennten Zähnen; Wangenraum 0,7-0,8 mal so breit wie die Mandibelbasis; Fühler 23-25-gliedrig, das vierte Glied 2,9-3,1 mal so lang wie breit, Distalhälfte der Geißel nicht erweitert, Glieder im distalen Drittel der Geißel etwa 1,1 mal so lang wie breit; Mesopleuren außerhalb des Speculums deutlich und mäßig dicht punktiert, an den Rändern auch gerunzelt; Hinterfemora 3,6-3,8 mal so lang wie hoch; Area superomedia 0,7-1,0 mal so lang wie breit; zweites Gastertergit 1,1-1,3 mal so lang wie breit, frontal bis über die Mitte fein gekörnelt und/oder längsgestreift; Bohrer wie bei *P. geniculatus*, Bohrerklappen 0,6-0,7 mal so lang wie das erste Gastertergit; Körperlänge 4-6 mm; Geißelbasis hell gelbbraun; Coxen gelbbraun, Hintercoxen basal zuweilen verdunkelt; Hinterfemora rotbraun, distal schmal verdunkelt; zweites und drittes Gastertergit hell rotbraun, die folgenden braun, caudal gelb gerandet.

Material: 5♀♀, Gotha/Thüringen/D, Hohenschwangau/Bayern/D, Tegernsee/Bayern/D (alle ZSM); Aygulf/Var/F (Coll. Aubert/MZL).

Artengruppe *hercynicus* Gravenhorst

Phygadeuon bavaricus, spec. nov.

Figs 1, 13, 21, 24, 35

Typen. Holotypus: ♀, "Ober-Bayern, Ellmau*, ca. 1050 m, 27.VII.1937. E. Bauer" (ZSM). – Paratypen: 5♀♀ vom gleichen Fundort; 3♀♀ Garmisch/Bayern/D, 700-1400 m; 1♀ Ettaler Berg/Oberammergau/Bayern/D, 800 m, alle im Juli-September gefangen, aus Coll. E. Bauer (ZSM, 1♀ aus Elmau HO).

Beschreibung

♀: Kopf und Thorax mit glattem Grund; Schläfen 1,2 mal so breit wie die Augen, hinter den Augen

* Bauer hat den Ort Elmau in Oberbayern mit der Schreibweise "Ellmau" angeführt. Dadurch besteht eine Verwechselungsmöglichkeit mit Ellmau in Nordtirol. An dem letztgenannten Ort hat Bauer aber anscheinend nicht gesammelt.

ein wenig verengt (Abb. 1), mit feinen weit voneinander entfernten Haarpunkten; Scheitel nach dorsal deutlich über das Niveau der Ocellen vorragend; Augen kahl; Clypeus etwa so lang wie das Gesicht, von diesem durch eine schwache Furche getrennt, im Profil flach, basal mit kräftigen voneinander getrennten Haarpunkten, am Apicalrand mit zwei dicht benachbarten spitzen Zähnen; oberer Mandibelzahn etwas größer als der untere; Wangenraum 0,6 mal so breit wie die Mandibelbasis; Fühler 20-gliedrig, das vierte Glied 2,3-2,4 mal so lang wie breit (Abb. 13), Distalhälfte der Geißel etwas keulenförmig, das breiteste Glied etwa 0,8 mal so lang wie breit.

Pronotum lateral zentral an einer kleinen Stelle unpunktiert, an den Rändern zerstreut punktiert, stellenweise gerunzelt, Epomia kräftig; Mesoscutum median sehr zerstreut punktiert, Seitenlappen zentral jeweils stellenweise unpunktiert; Mesopleuren außerhalb des großen Speculums überall deutlich fein und sehr zerstreut punktiert; Metapleuren ähnlich; Beine kräftig, Hinterfemora 3,1-3,3 mal so lang wie hoch; Areola etwa regelmäßig fünfeckig (Abb. 21); Nervellus bei 0,7 kräftig gebrochen, etwas incliv.

Propodeum vollständig gefeldert, in den Feldern kaum strukturiert, Area superomedia 0,7-0,9 mal so lang wie breit (Abb. 24), Area petiolaris wenig eingesenkt, Seitenecken als etwas breitere Lamellen, aber nicht spitz vorragend; erstes Gastertergit sehr fein gekörnelt, fast glatt, auf dem Postpetiolus stellenweise sehr fein längsgerieft (variabel), Dorsalkiele fast bis zu den Stigmen reichend, Dorsolateralleisten bis fast zum Caudalende divergierend; die folgenden Tergite glatt; zweites Gastertergit 1,0-1,2 mal so lang wie breit; Gaster vom dritten Segment an etwas von der Seite zusammengedrückt; Bohrer schlank, gerade, dorsal ohne deutlichen Nodus, an seiner Stelle eine kleine Runzel, ventral mit feinen Zahnleisten (Abb. 35), Bohrerklappen 1,0-1,1 mal so lang wie das erste Gastertergit.

Schwarz; Palpen, Mandibeln (Zähne dunkel), drittes bis fünftes Fühlerglied (Ausdehnung etwas variabel), Tegulae, Trochantellen, Femora, Tibien und Tarsen gelbbraun; Coxen apical unterschiedlich ausgedehnt gelbbraun gezeichnet; Flügelbasis gelb, Pterostigma mittelbraun, proximal und distal schmal weißlich, Flügelfläche klar; zweites bis viertes Gastertergit hell rotbraun, die folgenden schwarzbraun, caudal schmal gelb gerandet.

Holotypus (♀): Kopf 144 breit*; Thorax 250 lang, 122 breit (Mesoscutum); Vorderflügel 565 lang; erstes Gastertergit 122 lang; Postpetiolus 52 lang, 55 breit; zweites Tergit 110 lang, 96 breit; Bohrerklappen 135 lang; Körper etwa 780 lang.

♂ unbekannt.

Variation. Im NRS befindet sich als Paralectotypus von *P. thomsoni* 1♀ mit den Etiketten "Gl." (= Gotland/S), "Bhn", das mit dieser Beschreibung gut übereinstimmt, aber nur knapp 6 mm lang und zudem etwas beschädigt ist. Sein Status ist unklar.

Phygadeuon chilosiae Horstmann, 1975

Phygadeuon chilosiae Horstmann, 1975: 106 ff.

Beschreibung

Die Art ist *P. thomsoni* sehr ähnlich und vielleicht mit dieser synonym; allerdings ist von beiden Arten nur sehr wenig Material bekannt. Es bestehen folgende Unterschiede zur Beschreibung von *P. thomsoni*:

♀: Schläfen 1,0-1,1 mal so breit wie die Augen, direkt hinter den Augen deutlich etwas verengt; Hinterfemora 3,2-3,4 mal so lang wie hoch; zweites Gastertergit 0,7 mal so lang wie breit; Körperlänge 5 mm. Eine ausführliche Beschreibung findet sich bei Horstmann (l. c.).

Lebensweise. Als Wirt wurde *Cheilosia cynocephala* Loew an *Cirsium vulgare* nachgewiesen. Die Wirte wurden im Juni als Altlarven im Mark junger Spitzentriebe von *C. vulgare* gesammelt, die Parasiten schlüpften im Juli aus den Wirtspuparien. Die Art besitzt also entweder mehr als eine Generation im Jahr, oder die Weibchen überwintern als Imagines.

Material: 3♀♀, Schlüttsiel/Husum/Schleswig-Holstein/D (FRI, HO).

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* Alle Maße in 1/100 mm.

Phygadeuon clotho Kriechbaumer, 1892

Phygadeuon (Ischnocryptus) clotho Kriechbaumer, 1892: 344 f. (Aubert 1974: 269).
Phygadeuon grossae Horstmann 1981: 153 ff. (syn. nov.).

Beschreibung

♀: Schläfen 1,3-1,4 mal so breit wie die Augen, direkt hinter den Augen ein kleines Stück erweitert oder ein längeres Stück parallel, zerstreut bis sehr zerstreut punktiert; Scheitel nach dorsal etwas über das Niveau der Ocellen vorragend; Clypeus basal fein und dicht punktiert, subbasal mit einigen groben Punkten, teilweise mit feinen Querrunzeln, apical mit zwei dicht benachbarten spitzen Zähnen; Wangenraum 0,6 mal so breit wie die Mandibelbasis; Fühler 22-gliedrig, viertes Glied 2,4-2,6 mal so lang wie breit, Geißel distal nicht keulenförmig erweitert, das breiteste Glied etwa so lang wie breit; Mesopleuren außerhalb des Speculums zerstreut bis sehr zerstreut punktiert, ohne größere unpunktierte Bereiche; Hinterfemora 3,3-3,6 mal so lang wie hoch; Area superomedia 0,8-1,0 mal so lang wie breit; zweites Gastertergit frontal sehr fein gekörnelt, caudal glatt, 0,7-0,8 mal so lang wie breit; Bohrer wie bei *P. bavaricus*, Bohrerklappen 1,3-1,4 mal so lang wie das erste Gastertergit; Körperlänge 7-9 mm; drittes bis fünftes Fühlerglied gelbbraun; Coxen und Hinterfemora schwarz; Gaster hinter dem ersten Segment hell rotbraun oder das siebente Tergit braun gezeichnet. Eine ausführliche Beschreibung findet sich bei Horstmann (l. c.).

♂: Von allen Unterschieden, die zwischen den ♀♀ von *P. clotho* und *P. fraternae* gefunden wurden, scheint nur die Struktur des Clypeus auch für die ♂♂ brauchbar zu sein: Bei *P. clotho* ist der Clypeus basal auf größeren Flächen fein punktiert und subbasal grob punktiert und fein quergerunzelt, bei *P. fraternae* ist er basal kaum fein punktiert, sondern basal und subbasal grob punktiert und nicht quergerunzelt.

Lebensweise. Als Wirte wurden nachgewiesen: *Cheilosia grossa* (Fallén) an *Carduus nutans*, *Cirsium palustre* und *C. vulgare*, leg. Boldt, leg. Freese, leg. Nurse, leg. Rotheray, leg. Stuke (HO, NHML, NMSE, ZSM); *Cheilosia albipila* Meigen an *Cirsium palustre* und *C. vulgare*, leg. Freese, leg. Romstöck, leg. Stuke (HO, NMSE). Die Wirte wurden von Juni bis September als Larven gesammelt, die Puparien wurden im Herbst gebildet, die Parasiten schlüpften von März bis Juli aus den Puparien (bei Treibzucht im Januar). *P. clotho* ist also ein Endoparasit und Koinobiont (Rotheray 1988: 22; Freese 1997: 76), im Gegensatz zu vielen anderen *Phygadeuon*-Arten.

Material: 20♀♀, 9♂♂, Gartlea Farm/Dunbartonshire/GB (NMSE), Aviemore/Inverness/GB, Staunton/Gloucestershire/GB, Tring/Hertfordshire/GB, Ampton/Suffolk/GB, Blythburgh Wood/Suffolk/GB, Timworth/Suffolk/GB (alle NHML); Bremen/D, Stade/Niedersachsen/D (alle HO); Goslar/Niedersachsen/D (ZSM); Worms/Rheinland-Pfalz/D (NSF); Bayreuth/Bayern/D (HO, NMSE); München/Bayern/D, Setzberg/Kreuth/Bayern/D (beide ZSM); Sollenau/Niederösterreich/A (HO); Rom/I (HO, ZSM).

Phygadeuon fraternae, spec. nov.

Figs 2, 9, 14, 22, 25, 36

Typen. Holotypus: ♀, "Niedersachsen, Landkreis Stade, Schwingetal WW, *Cirsium palustre*, ex L, 05.09.1996 leg. Stuke, 20.5.97, Zucht 74", "ex (Dipt.) *Cheilosia fraterna*" (ZSM). – Paratypen: 1♂ aus der gleichen Zucht (HO); 4♀♀, 1♂ Gartlea Farm/Dunbartonshire/GB, ex *Cheilosia fraterna* (Meigen), leg. Rotheray; 1♀ Portland Hill/Midlothian/GB, ex *C. fraterna*, leg. Robertson (alle NMSE); 1♀ Bodendorf/Bayreuth/Bayern/D, ex *C. fraterna*, leg. Freese (HO); 1♀, 1♂ Braken/Stade/Niedersachsen/D, ex *Cheilosia chloris* (Meigen), leg. Stuke (HO, STU); 1♀ Blankenburg/Thüringen/D, leg. Schmiedeknecht; 5♀♀ Garmisch/Bayern/D, 700-1400 m, Juli-September; 1♀ Mittenwald/Bayern/D, 1000m, 7.7.1924; 1♀ Elmau/Bayern/D, 1050 m, 3.7.1957; 1♀ Bad Hall/Oberösterreich/A, 2.-3.8.1942, alle aus Coll. E. Bauer (ZSM); 1♀ Podcetrtek/Slowenien, Mai 1938, leg. Jaeger (ZSM).

Beschreibung

♀: Kopf und Thorax mit glattem Grund; Schläfen 1,1-1,3 mal so breit wie die Augen, direkt hinter den Augen etwas erweitert oder ein kurzes Stück parallel (Abb. 2), sehr zerstreut punktiert oder stellenweise unpunktiert; Scheitel nach dorsal ein wenig über das Niveau der Ocellen vorragend; Augen kahl; Clypeus etwa so lang wie das Gesicht, im Profil fast flach, vom Gesicht durch eine schwach

entwickelte Furche getrennt, basal mit wenigen kräftigen Haarpunkten, ohne Querrunzeln, am Apicalrand mit einem Doppelzahn (Abb. 9) oder zwei dicht benachbarten spitzen Zähnen (variabel); oberer Mandibelzahn etwas größer als der untere; Wangenraum 0,6 mal so breit wie die Mandibelbasis; Fühler 20-gliedrig, das vierte Glied 2,1-2,3 mal so lang wie breit (Abb. 14), Distalhälfte der Geißel etwas keulenförmig, das breiteste Glied 0,9 mal so lang wie breit.

Pronotum lateral zentral mit einer kleinen unpunktierten Stelle, dorsal relativ dicht punktiert, an den Rändern gerunzelt, Epomia deutlich; Mesoscutum fein zerstreut punktiert, auf den Seitenlappen zentral jeweils unpunktiert; Mesopleuren außerhalb des großen Speculums zerstreut bis sehr zerstreut punktiert; Metapleuren ähnlich; Beine kräftig, Hinterfemora 2,9-3,2 mal so lang wie hoch; Areola mit dem rücklaufenden Nerven distal der Mitte (Abb. 22); Nervellus bei 0,7-0,8 kräftig gebrochen, deutlich incliv.

Propodeum vollständig gefeldert, in den Feldern sehr fein oder gar nicht strukturiert, Area superomedia 0,6-1,0 mal so lang wie breit (Abb. 25), Area petiolaris etwas eingesenkt, Seitenecken als breitere Lamellen, aber nicht spitz vorragend; erstes Gastertergit fein gekörnelt, Postpetiolus teilweise fein längsgerieft, Dorsalkiele bis zu den Stigmen reichend, Dorsolateralleisten bis fast zum Caudalende divergierend; die folgenden Tergite glatt; das zweite Gastertergit 0,8-0,9 mal so lang wie breit; Gaster vom dritten Segment an etwas von der Seite zusammengedrückt; Bohrer gerade, schlank zugespitzt, dorsal ohne deutlichen Nodus, ventral mit feinen Zahnleisten (Abb. 36), Bohrerklappen 1,1-1,2 mal so lang wie das erste Gastertergit.

Schwarz; Palpen dunkelbraun; Mandibeln ganz schwarz oder median unterschiedlich breit rotbraun gezeichnet; drittes bis sechstes oder zweites bis achtes Fühlerglied gelbbraun; Tegulae schwarz, Flügelbasis gelb, Pterostigma dunkelbraun, proximal breit, distal schmal weißlich, Flügelfläche klar; Trochantellen teilweise rotbraun gemustert; Vorder- und Mittelfemora proximal schwarz, distal rotbraun, Hinterfemora schwarz, teilweise distal rotbraun gezeichnet; Tibien und Tarsen der Vorder- und Mittelbeine rotbraun, Tarsenspitzen dunkel, Hintertibien proximal und distal schwarz, median breit rotbraun, Hintertarsen schwarzbraun; Gaster hinter dem ersten Segment rotbraun, selten das siebente oder sechste und siebente Tergit dunkel gezeichnet.

Holotypus (♀): Kopf 119 breit; Thorax 209 lang, 99 breit (Mesoscutum); Vorderflügel 480 lang; erstes Gastertergit 105 lang; Postpetiolus 49 lang, 49 breit; zweites Tergit 91 lang, 110 breit; Bohrerklappen 130 lang; Körper etwa 630 lang.

♂: Schläfen durchgehend zerstreut punktiert; Fühler 26-gliedrig, das vierte Glied etwa 2,5 mal so lang wie breit, Tyloide am 12.-15. Glied, Geißel distal zugespitzt; Mesopleuren im Zentrum unpunktiert; Hinterfemora 4,5 mal so lang wie hoch; Postpetiolus und zweites Gastertergit fein längsgestreift; Gaster caudal nicht von der Seite zusammengedrückt; Fühler ganz schwarz; sonst etwa wie ♀.

Lebensweise. Als Wirte wurden nachgewiesen: *Cheilosia fraterna* (Meigen) an *Cirsium palustre,* leg. Freese, leg. Robertson, leg. Rotheray, leg. Stuke; *Cheilosia chloris* (Meigen) an *Cirsium oleraceum,* leg. Stuke. Die Wirte wurden Ende August bis Anfang Oktober als Larven in den Rosetten der Wirtspflanzen gesammelt, die Puparien wurden im Spätherbst gebildet, die Parasiten schlüpften zwischen Mai und Juli (bei Treibzucht Ende März). Hilpert (1987: 153; als *Phygadeuon* sp. 1) fing die ♀♀ der Art im August und September. Die Phänologie und die Parasitierungsstrategie dieser Art stimmen anscheinend mit denen von *P. clotho* überein.

Weiteres Material: 1♀ wurde in Gartlea Farm/Dunbartonshire/GB an *Cirsium palustre* aus *Cheilosia proxima* (Zetterstedt) gezüchtet (leg. Rotheray, NMSE). Es ist nur 5 mm lang, die Fühler sind 19-gliedrig, und der Gaster ist hinter der Basis des vierten Tergits dunkelbraun bis schwarz. Sonst stimmt es mit *P. fraternae* gut überein. 1♀ und 5♂♂ wurden auf der Reschenalm/Vinschgau/Südtirol/I in 2200 m Meereshöhe an *Cirsium eriophorum* aus *Cheilosia albipila* Meigen gezüchtet (leg. Stuke, HO). Das ♀ ist etwas beschädigt, passt aber gut zu *P. fraternae* und gar nicht zu *P. clotho,* dem anderen Parasiten dieser Wirtsart. 1♀ aus Halland/S (etwas beschädigt und ausgebleicht) steckt im NRS unter dem Namen *P. hercynicus.* Zu *P. fraternae* gehört auch das von Hilpert (1987: 153 f.) auf dem Feldberg im Schwarzwald/Baden-Württemberg/D gefangene und unter dem Namen *Phygadeuon (Iselix)* sp. 1 verzeichnete Material.

Phygadeuon hercynicus Gravenhorst, 1829

Phygadeuon hercynicus Gravenhorst, 1829: 709 f. (Aubert 1968: 181). Dem Holotypus (♀) fehlen beide Fühler hinter dem dritten Glied und die Spitze des Bohrers. Soweit zu erkennen ist, stimmt er mit 1♀ in Coll. Kriechbaumer (ZSM) überein, das Kriechbaumer (1892: 341 f.) aus Coll. Siebold erwähnt (ohne Fundortangabe). Dieses ♀, bei dem allerdings auch nur die proximale Hälfte eines Fühlers erhalten ist, wird zur Interpretation der Art herangezogen.

Die beiden von Kriechbaumer unter dem Namen *P. hercynicus* erwähnten Exemplare aus München-Isarauen und vom Tegernsee gehören zu *P. laevipleuris* (ZSM). *P. hercynicus* sensu Roman (1925: 11) ist ein Gemisch von mehreren Arten: *P. brevitarsis, P. fraternae, P. nitidus,* dazu einige defekte Exemplare (NRS).

Beschreibung

♀: Schläfen 1,1 mal so breit wie die Augen, direkt hinter den Augen ein kurzes Stück parallel, zerstreut bis sehr zerstreut punktiert, stellenweise unpunktiert; Scheitel nach dorsal deutlich etwas über das Niveau der Ocellen vorragend; Clypeus basal deutlich punktiert, ohne Querrunzeln, apical mit zwei dicht benachbarten spitzen Zähnen; Wangenraum 0,6 mal so breit wie die Mandibelbasis; viertes Fühlerglied 2,0 mal so lang wie breit (nach dem ♀ aus Coll. Siebold/ZSM; kein Fühler vollständig erhalten); Mesopleuren außerhalb des Speculums zerstreut bis sehr zerstreut punktiert; Hinterfemora 3,6-3,7 mal so lang wie hoch; Area superomedia 0,7 mal so lang wie breit; zweites Gastertergit glatt, 1,0-1,1 mal so lang wie breit; Bohrer gerade oder etwas abwärts gebogen, wie bei *P. bavaricus,* Bohrerklappen 0,9 mal so lang wie das erste Gastertergit; Körperlänge 5-6 mm; Geißelbasis gelbbraun; Coxen dunkelbraun, Vorder- und Mittelcoxen apical rotbraun gezeichnet; Hinterfemora und zweites bis viertes Tergit rotbraun, die folgenden Tergite dunkelbraun gezeichnet, caudal schmal gelb gerandet. Eine ausführliche Beschreibung des Holotypus findet sich bei Frilli (1974: 132 ff.).

Material: 2♀♀, Harz/Norddeutschland (Coll. Gravenhorst/MPW), ohne Ort (aus Coll. Siebold) (ZSM).

Variation. Einige ♀♀ weichen von der Nominatform vor allem durch die dunkel gezeichneten und etwas gedrungeneren Hinterfemora ab. Ihr Status ist unklar. Merkmale: Schläfen 1,0-1,1 mal so breit wie die Augen, hinter den Augen etwas verengt; Fühler 19-20-gliedrig, das vierte Glied 2,0-2,1 mal so lang wie breit, Distalhälfte der Geißel etwas keulenförmig, das breiteste Glied 0,9 mal so lang wie breit; Hinterfemora 3,3-3,6 mal so lang wie hoch, vollständig oder nur median dunkelbraun gezeichnet; Area superomedia 0,7-0,8 mal so lang wie breit; Bohrerklappen 0,8-1,0 mal so lang wie das erste Gastertergit. Material: 5♀♀, Plumstad/London/GB, Großbritannien (aus Coll. Morley), Deutschland (aus Coll. Ruthe) (alle NHML), Krefeld/Nordrhein-Westfalen/D, Worms/Rheinland-Pfalz/D (beide NSF).

Phygadeuon praealpinus, spec. nov.

Figs 3, 10, 15, 26, 37

Typen. Holotypus (♀): "Ober-Bayern, Garmisch, 700 m, 25.VII.1954, E. Bauer" (ZSM). – Paratypen: 8♀♀ vom gleichen Fundort, Juli-August; 7♀♀ Ettaler Berg/Garmisch/Bayern/D, 800 m, Juni-Juli; 2♀♀ Kramer/Garmisch/Bayern/D, 850 m, August; 2♀♀ Riezlern/Allgäu/Bayern/D, 1150 m, September, alle aus Coll. E. Bauer (ZSM, 2♀♀ aus Garmisch HO).

Beschreibung

♀: Kopf und Thorax mit glattem Grund; Schläfen so lang wie die Augen, direkt hinter den Augen ein kurzes Stück parallel (Abb. 3), fein und sehr zerstreut punktiert, stellenweise unpunktiert; Scheitel nach dorsal wenig über das Niveau der Ocellen vorragend; Augen kahl; Clypeus etwa so lang wie das Gesicht, von diesem durch eine schwach entwickelte Furche getrennt, im Profil fast flach, basal mit kräftigen getrennten Punkten, ohne Querrunzeln, apical mit zwei deutlich getrennten spitzen Zähnen (Abb. 10), oberer Mandibelzahn etwas größer als der untere; Wangenraum 0,6 mal so breit wie die Mandibelbasis; Fühler 21-gliedrig, relativ schlank, das vierte Glied 3,3-3,5 mal so lang wie breit (Abb. 15), Distalhälfte der Geißel kaum keulenförmig, das breiteste Glied 0,9-1,0 mal so lang wie breit.

Pronotum dorsolateral fein und sehr zerstreut punktiert, stellenweise unpunktiert, in der Furche schwach gestreift, Epomia deutlich; Mesoscutum fein und sehr zerstreut punktiert, stellenweise unpunktiert; Mesopleuren außerhalb des großen Speculums fein und sehr zerstreut punktiert, im Zen-

trum unpunktiert; Metapleuren sehr zerstreut punktiert; Beine relativ schlank, Hinterfemora 3,8-3,9 mal so lang wie hoch; Areola mit dem rücklaufenden Nerv etwas distal der Mitte (etwa wie Abb. 22); Nervellus bei 0,7 kräftig gebrochen, etwas incliv.

Propodeum vollständig gefeldert, in den Feldern wenig strukturiert, Area superomedia 0,8-1,0 mal so lang wie breit (Abb. 26), Area petiolaris wenig eingesenkt, Seitenecken als etwas breitere Lamellen, nicht zugespitzt; erstes Gastertergit stellenweise sehr fein gekörnelt und mit einigen feinen Punkten, auf dem Postpetiolus teilweise sehr fein längsgestreift, Dorsalkiele schwach entwickelt, knapp bis zu den Stigmen reichend, Dorsolateralleisten in der Caudalhälfte des Postpetiolus parallel; die folgenden Tergite glatt; zweites Tergit etwa 1,5 mal so lang wie breit; Gaster vom zweiten Segment an schwach, von dritten an deutlich von der Seite zusammengedrückt; Bohrer gerade, dorsal ohne deutlichen Nodus, ventral mit feinen Zahnleisten (Abb. 37), Bohrerklappen 0,6-0,7 mal so lang wie das erste Gastertergit.

Schwarz; Palpen gelblich; Mandibeln median breit rotbraun; zweites bis sechstes Fühlerglied hell rotbraun, Flagellum median dunkelbraun, distal schwarz; Tegulae gelbbraun, Flügelbasis gelb, Pterostigma mittelbraun, proximal und distal wenig aufgehellt, Flügelfläche klar; Coxen dunkelbraun, apical gelbrot gefleckt (an den Hintercoxen am wenigsten), Trochanteren gelb und braun gemustert (variabel), Trochantellen gelblich, Femora, Tibien und Tarsen der Vorder- und Mittelbeine hell rotbraun, Hinterfemora schwarzbraun, proximal und distal etwas aufgehellt, Hintertibien rotbraun, proximal und distal schmal verdunkelt, Hintertarsen dunkelbraun; zweites bis viertes Gastertergit rotbraun, die folgenden dunkelbraun bis schwarz, caudal schmal gelb gerandet.

Holotypus (♀): Kopf 135 breit; Thorax 236 lang, 110 breit (Mesoscutum); Vorderflügel 530 lang; erstes Gastertergit 122 lang; Postpetiolus 57 lang, 42 breit; zweites Tergit 104 lang, 69 breit; Bohrerklappen 88 lang; Körper etwa 660 lang.

♂ unbekannt.

Phygadeuon thomsoni Roman, 1925

Phygadeuon thomsoni Roman, 1925: 11 f. – Lectotypus (♀) hiermit festgelegt: "L-d" (= Lund/Scåne/S), "*Hercynicus*" (Coll. Thomson/ZIL, unter *P. hercynicus*). Als Paralectotypen sind in Coll. Thomson 4♂♂ vom Fundort Lund vorhanden, die zur Zeit unbestimmbar sind. Ein Paralectotypus (♀) im NRS gehört wahrscheinlich zu *P. bavaricus*.

Roman (l. c.) hat *P. thomsoni* als "n. nov." für *P. hercynicus* sensu Thomson (1884: 958 f.) nec *P. hercynicus* Gravenhorst eingeführt. Da Thomson keine neue Art beschrieben, sondern Gravenhorst als Autor zitiert hat, handelt es sich nicht um ein Nomen novum im Sinne der Nomenklaturregeln, sondern um eine Neubeschreibung.

Beschreibung

♀: Schläfen 1,1-1,2 mal so breit wie die Augen, direkt hinter den Augen ein kurzes Stück parallel, zerstreut bis sehr zerstreut punktiert; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Clypeus basal deutlich punktiert, ohne Querrunzeln, apical mit zwei deutlich getrennten spitzen Zähnen; Wangenraum 0,6 mal so breit wie die Mandibelbasis; Fühler 20-gliedrig, das vierte Glied 2,0 mal so lang wie breit, Distalhälfte der Geißel etwas keulenförmig, das breiteste Glied 0,9 mal so lang wie breit; Mesopleuren außerhalb des Speculums gleichmäßig zerstreut bis sehr zerstreut punktiert; Hinterfemora 3,1-3,2 mal so lang wie hoch; Area superomedia 0,8-0,9 mal so lang wie breit; zweites Gastertergit glatt, 0,8 mal so lang wie breit; Bohrer wie bei *P. bavaricus,* Bohrerklappen so lang wie das erste Gastertergit; Körperlänge 5-6 mm; Geißelbasis gelbbraun; Coxen schwarz; Hinterfemora rotbraun; zweites bis viertes Gastertergit rotbraun, teilweise das vierte caudal verdunkelt, die folgenden dunkelbraun, caudal schmal gelb gerandet.

Material: 3♀♀, Wicken Fen/Cambridgeshire/GB (NHML); Lund/Scåne/S (ZIL), Krefeld/Nordrhein-Westfalen/D (ZSM).

Phygadeuon unidentatus, spec. nov.
Figs 4, 11, 16, 27, 38

Holotypus (♀): "Harz Harzburg, Radautal, 14.IX.1943, E. Bauer" (ZSM).

Beschreibung

♀: Kopf und Thorax mit glattem Grund; Schläfen 1,4 mal so breit wie die Augen, direkt hinter den Augen ein kurzer Stück erweitert (Abb. 4), fein und sehr zerstreut punktiert, stellenweise unpunktiert; Scheitel nach dorsal deutlich über das Niveau der Ocellen vorragend; Augen kahl; Clypeus etwa so lang wie das Gesicht, von diesem kaum getrennt, im Profil fast flach, basal mit einigen groben Punkten, apical mit einem kleinen spitzen Zahn (Abb. 11); oberer Mandibelzahn wenig größer als der untere; Wangenraum 0,6 mal so breit wie die Mandibelbasis; Fühler 19-gliedrig, das vierte Glied 2,0 mal so lang wie breit (Abb. 16), Distalhälfte der Geißel etwas keulenförmig, das breiteste Glied 0,9 mal so lang wie breit.

Pronotum dorsolateral sehr zerstreut punktiert, in der Furche gestreift, Epomia deutlich; Mesoscutum fein und sehr zerstreut punktiert, auf den Seitenlappen größere Bereiche unpunktiert; Mesopleuren außerhalb des großen Speculums fein und sehr zerstreut punktiert; Metapleuren ähnlich; Beine kräftig, Hinterfemora 2,9 mal so lang wie hoch; Areola regelmäßig (wie Abb. 21); Nervellus bei 0,7 kräftig gebrochen, etwas incliv.

Propodeum lang, fein und vollständig gefeldert, in den Feldern kaum strukturiert, Area superomedia 1,2 mal so lang wie breit (Abb. 27), Area petiolaris wenig eingesenkt, Seitenecken als etwas breitere Lamellen, nicht zugespitzt; erstes Gastertergit sehr fein gekörnelt, fast glatt, neben den Stigmen sehr fein längsgestreift, Dorsalkiele nicht bis zu den Stigmen reichend, Dorsolateralleisten fast bis zum Caudalende divergierend; die folgenden Tergite glatt; zweites Tergit 1,2 mal so lang wie breit; Gaster vom zweiten Tergit an etwas von der Seite zusammengedrückt; Bohrer schlank, wenig abwärts gebogen, dorsal ohne deutlichen Nodus, ventral mit feinen Zahnleisten (Abb. 38), Bohrerklappen 1,2 mal so lang wie das erste Gastertergit.

Schwarz; Palpen gelblich; Mandibeln median breit gelbrot; zweites bis sechstes Fühlerglied hell rotbraun, Flagellum median dunkelbraun, distal schwarz; Tegulae gelbbraun, Flügelbasis gelb, Pterostigma mittelbraun, proximal und distal weißlich, Flügelfläche klar; Beine hell rotbraun, Vorder- und Mittelcoxen basal und Hintercoxen fast ganz dunkelbraun, Hintertrochanteren und Hintertibien proximal verdunkelt; zweites bis viertes Gastertergit rotbraun, die folgenden dunkelbraun, caudal schmal gelb gerandet, Postpetiolus caudal-median rotbraun gezeichnet.

Holotypus (♀): Kopf 110 breit; Thorax 209 lang, 88 breit (Mesoscutum); Vorderflügel 495 lang; erstes Gastertergit 96 lang; Postpetiolus 42 lang, 42 breit; zweites Tergit 85 lang, 69 breit; Bohrerklappen 110 lang; Körper etwa 620 lang.

♂ unbekannt.

Artengruppe *lachesis* Kriechbaumer

Phygadeuon lachesis Kriechbaumer, 1892
Figs 12, 39

Phygadeuon (Ischnocryptus) lachesis Kriechbaumer, 1892: 345 f. (Aubert 1974: 269).

Beschreibung

♀: Schläfen 1,1-1,2 mal so breit wie die Augen, direkt hinter den Augen ein kurzes Stück parallel, deutlich zerstreut bis sehr zerstreut punktiert, an kleinen Stellen unpunktiert; Scheitel nach dorsal sehr wenig über das Niveau der Ocellen vorragend; Clypeus basal deutlich punktiert, apical mit einem lamellenartigen schwach doppelt gewellten Rand, die Zähne nur als subapicale Oberflächenstruktur erkennbar (Abb. 12); Wangenraum 0,5-0,6 mal so breit wie die Mandibelbasis; Fühler 23-gliedrig, das vierte Glied 2,0-2,1 mal so lang wie breit, Geißel in der Distalhälfte etwas keulenförmig erweitert, das breiteste Glied etwa 0,9 mal so lang wie breit; Mesopleuren außerhalb des Speculums deutlich zerstreut bis sehr zerstreut punktiert; Hinterfemora 2,8-3,1 mal so lang wie hoch; Area superomedia 0,8-1,0 mal so lang wie breit; zweites Gastertergit glatt, 0,8-0,9 mal so lang wie breit; Bohrer schlank, wenig abwärts

gebogen, dorsal vor dem Nodus mit einer rundlichen Vorwölbung, der Nodus selbst nur als kleine Runzel ausgebildet, ventral mit feinen Zahnleisten (Abb. 39), Bohrerklappen 1,5 mal so lang wie das erste Gastertergit; Körperlänge 6-7 mm; drittes bis fünftes oder sechstes Fühlerglied rotbraun; Coxen schwarz; Hinterfemora schwarz, ventral-distal zuweilen rotbraun gezeichnet; Gaster hinter den ersten Segment hell rotbraun, die letzten Tergite caudal gelb gerandet, der Postpetiolus zuweilen caudal-median rotbraun gefleckt.

Material: 5♀♀, Garmisch/Bayern/D, Murnau/Bayern/D, Setzberg/Kreuth/Bayern/D (ZSM, 1♀ HO).

Artengruppe *nitidus* Gravenhorst

Phygadeuon atropos Kriechbaumer, 1892

Phygadeuon (Ischnocryptus) atropos Kriechbaumer, 1892: 346 – Lectotypus (♀) von Aubert (1968: 193) festgelegt: "M. Hess. 19.5.86. Krchb." (= München-Hesselohe). Aubert (1974: 268 f.) führt 1♀ mit dem Etikett "Teg. 6.9.56. Krchb." (= Tegernsee) als "type" an (beide ZSM), ohne seine frühere Festlegung zu berücksichtigen.

Ischnocryptus atropos (Kriechbaumer) var. *rufifemur* Seyrig, 1927: 79 (syn. nov.) – Holotypus (♀): "Vendresse 25.8.26 Benoist" (MHNP).

Aubert (1974: 269) hat *P. atropus* als jüngeres Synonym zu *P. forticornis* (Kriechbaumer) gestellt. Zwischen beiden Taxa bestehen aber einige Unterschiede (siehe Bestimmungsschlüssel), sie werden deshalb als verschiedene Arten geführt. Der Holotypus der var. *rufifemur* Seyrig unterscheidet sich von der Nominatform nur durch die rotbraunen Hinterfemora, beide werden deshalb hier synonymisiert.

Beschreibung

♀: Schläfen so breit wie die Augen, direkt hinter den Augen ein kurzes Stück parallel oder verengt, sehr zerstreut punktiert, stellenweise unpunktiert; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Clypeus basal deutlich punktiert, ohne Querrunzeln, apical mit zwei deutlich getrennten spitzen Zähnen; Wangenraum 0,6-0,7 mal so breit wie die Mandibelbasis; Fühler 19-20-gliedrig, das vierte Glied 1,9 mal so lang wie breit, Geißel in der Distalhälfte etwas keulenförmig, das breiteste Glied 0,8-0,9 mal so lang wie breit; Mesopleuren außerhalb des Speculums fein und sehr zerstreut punktiert, teilweise im Zentrum unpunktiert; Hinterfemora 2,9-3,1 mal so lang wie hoch; Area superomedia 0,8-1,0 mal so lang wie breit; zweites Gastertergit glatt, 0,7-0,8 mal so lang wie breit; Bohrer wie bei *P. laevipleuris*, Bohrerklappen 1,0-1,1 mal so lang wie das erste Gastertergit; Körperlänge 4-6 mm; Geißelbasis in der Regel nur wenig braun überlaufen, selten das dritte bis fünfte Fühlerglied gelbbraun; Coxen schwarz; Hinterfemora schwarz, distal aufgehellt (Nominatform), oder rotbraun (var. *rufifemur* Seyrig); zweites bis viertes, fünftes oder sechstes Gastertergit hell rotbraun, die folgenden dunkelbraun, caudal schmal gelb gerandet.

Material: 11♀♀, Newlands/Gloucestershire/GB, Porlock/Somerset/GB, ohne Ort aus Coll. Morley (vermutlich aus GB) (alle NHML); Mellum/Niedersachsen/D (HO); Babenhausen/Hessen/D (Frankfurt), Garmisch/Bayern/D, München/Bayern/D, Tegernsee/Bayern/D (alle ZSM); Vendresse/Ardennes/F (MHNP).

Phygadeuon forticornis Kriechbaumer, 1892

Phygadeuon (Ischnocryptus) forticornis Kriechbaumer, 1892: 344 (Aubert 1974: 269). Da dem Holotypus, dem einzigen bisher bekannten Exemplar der Art, die Geißeln fehlen, ist die Interpretation der Art unsicher.

Beschreibung

♀: Schläfen 1,1 mal so breit wie die Augen, direkt hinter den Augen ein kurzes Stück erweitert, fein und sehr zerstreut punktiert; Clypeus basal deutlich punktiert und etwas quergerunzelt, apical mit zwei deutlich getrennten spitzen Zähnen; Wangenraum 0,9 mal so breit wie die Mandibelbasis; Mesopleuren außerhalb des Speculums fein und sehr zerstreut punktiert; Hinterfemora 3,6 mal so lang wie hoch; Area superomedia so lang wie breit; zweites Gastertergit glatt, so lang wie breit; Bohrer wie bei *P. laevipleuris*, Bohrerklappen 0,9 mal so lang wie das erste Gastersegment; Körperlänge 9 mm; Coxen und Hinterfemora schwarz; Gaster hinter dem ersten Segment rotbraun.

Material: 1♀, München/Bayern/D (ZSM).

Phygadeuon habermehli Roman, 1930

Phygadeuon (Ischnocryptus) habermehli Roman, 1930: 6 f. (Townes et al. 1965: 148). Der Lectotypus (♀) aus Kamtschatka ist das einzige untersuchte Exemplar der Nominatform. In Europa kommt eine Morphe vor, die durch ganz rotbraune Hinterfemora und eine etwas größere Körperlänge abweicht; sie wird ebenfalls zu *P. habermehli* gestellt.

Beschreibung

♀: Schläfen 1,1 mal so breit wie die Augen, direkt hinter den Augen kaum verengt, fein und sehr zerstreut punktiert, größere Bereiche unpunktiert; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Clypeus basal und median grob und zerstreut punktiert, apical mit zwei deutlich getrennten spitzen Zähnen; Wangenraum 0,6 mal so breit wie die Mandibelbasis; Fühler 20-gliedrig (bei ♀♀ aus Mitteleuropa; dem Lectotypus fehlen beide Geißelspitzen), das vierte Glied zweimal so lang wie breit, Distalhälfte der Geißel etwas keulenförmig, das breiteste Glied 0,8 mal so lang wie breit; Mesopleuren außerhalb des Speculums zerstreut bis sehr zerstreut punktiert, aber ohne größere unpunktierte Stellen; Hinterfemora 3,3 mal so lang wie hoch; Area superomedia 0,8 mal so lang wie breit; zweites Gastertergit glatt, 0,7 mal so lang wie breit; Bohrer wie bei *P. laevipleuris*, Bohrerklappen 0,6-0,7 mal so lang wie das erste Gastertergit; Körperlänge 5 mm (beim Lectotypus) oder 6 mm (bei ♀♀ aus Mitteleuropa); Geißelbasis nur wenig braun überlaufen; Coxen schwarz; Hinterfemora dunkelbraun (beim Lectotypus) oder rotbraun (bei ♀♀ aus Mitteleuropa); zweites bis viertes Gastertergit rotbraun, die folgenden dunkelbraun, caudal gelb gerandet.

Material: 5♀♀, Kamtschatka/Ost-Sibirien (NRS), Goslar/Niedersachsen/D, Garmisch/Bayern/D, ohne Ort aus Coll. Schmiedeknecht (vermutlich aus Thüringen/D) (ZSM, 1♀ HO).

Phygadeuon laevipleuris, spec. nov.

Figs 5, 17, 28, 40

Typen. Holotypus: ♀, "Weibersbrunn, Spessart, 13.9.67", "Bayern, Horstm. leg." (ZSM). – Paratypen: 1♀ vom gleichen Fundort und -tag; 2♀♀ Mespelbrunn/Bayern/D, 7.9.1967, leg. Horstmann (alle HO); 3♀♀ Garmisch/Bayern/D, 700 m, Juli-September; 1♀ Andechs/Bayern/D, 22.8.1935; 1♀ Rogaska Slatina/Slowenien, 14.8.1939, alle aus Coll. E. Bauer (ZSM).

Beschreibung

♀: Kopf und Thorax mit glattem Grund; Schläfen so breit wie die Augen, direkt hinter den Augen ein kurzes Stück parallel (Abb. 5), mit feinen, stellenweise weit voneinander entfernten Haarpunkten; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Augen kahl; Clypeus etwa so lang wie das Gesicht, von diesem durch eine wenig entwickelte Furche getrennt, im Profil flach, basal mit kräftigen voneinander getrennten Haarpunkten, ohne Querrunzeln, am Apicalrand mit zwei deutlich getrennten spitzen Zähnen; oberer Mandibelzahn etwas größer als der untere; Wangenraum 0,7 mal so breit wie die Mandibelbasis; Fühler 20-21-gliedrig, das vierte Glied 2,3-2,4 mal so lang wie breit (Abb. 17), Distalhälfte der Geißel etwas keulenförmig, das breiteste Glied 0,8 mal so lang wie breit.

Pronotum dorsolateral zerstreut punktiert, an den Rändern gerunzelt, Epomia deutlich; Mesoscutum fein und sehr zerstreut punktiert, Seitenlappen zentral jeweils an kleinen Stellen unpunktiert; Mesopleuren außerhalb des großen Speculums im Zentrum unpunktiert, an den Rändern zerstreut bis sehr zerstreut punktiert; Metapleuren sehr zerstreut punktiert; Beine kräftig, Hinterfemora 3,3-3,7 mal so lang wie hoch; Areola mit dem rücklaufenden Nerven etwas distal der Mitte (etwa wie Abb. 22); Nervellus bei 0,7 kräftig gebrochen, deutlich etwas incliv.

Propodeum vollständig gefeldert, in den Feldern wenig strukturiert, Area superomedia 0,8-1,0 mal so lang wie breit (Abb. 28), Area petiolaris wenig eingesenkt, Seitenecken als etwas breitere Lamellen, aber nicht zugespitzt; erstes Gastertergit sehr fein gekörnelt, stellenweise sehr fein zerflossen längsrunzlig, Postpetiolus dorsolateral fein längsrissig (variabel), Dorsalkiele bis zu den Stigmen reichend, Dorsolateralleisten bis fast zum Caudalende divergierend; die folgenden Tergite glatt; zweites Tergit 1,0-1,1 mal so lang wie breit; Gaster vom dritten Segment an etwas von der Seite zusammengedrückt; Bohrer schlank, gerade oder wenig abwärts gebogen, dorsal am Nodus mit einem zahnartigen Vorsprung, davor mit einem weiteren Zahn, ventral mit feinen Zahnleisten (Abb. 40), Bohrerklappen 1,0

mal so lang wie das erste Gastertergit.

Schwarz; Palpen braun; Mandibeln und Tegulae schwarzbraun, selten Mandibeln median rotbraun gezeichnet; drittes bis fünftes Fühlerglied gelbbraun, dann Geißel zunehmend dunkler, median und distal schwarz; Flügelbasis gelb, Pterostigma schwarzbraun, proximal wenig aufgehellt, Flügelfläche klar; Coxen und Trochanteren schwarzbraun, Trochantellen, Femora, Tibien und Tarsen rotbraun, Hintertibien proximal und alle Tarsen distal verdunkelt; zweites und drittes Gastertergit rotbraun, häufig auch die Seiten des vierten, die folgenden dunkelbraun, caudal schmal gelb gerandet, Postpetiolus median-caudal rotbraun gezeichnet.

Holotypus (♀): Kopf 144 breit; Thorax 243 lang, 116 breit (Mesoscutum); Vorderflügel 540 lang; erstes Gastertergit 121 lang; Postpetiolus 55 lang, 52 breit; zweites Tergit 100 lang, 94 breit; Bohrerklappen 118 lang; Körper etwa 720 lang.

♂ unbekannt.

Weiteres Material: Zu *P. laevipleuris* gehören auch die beiden von Kriechbaumer (1992: 342) unter dem Namen *P. hercynicus* erwähnten ♀♀ (beide mit gebrochenen Fühlern) aus München-Isarauen/D, 9.9.1884, und vom Tegernsee/Bayern/D, 11.8.1855 (ZSM).

Phygadeuon nigrifemur, spec. nov.

Figs 6, 18, 29, 41

Typen. Holotypus: ♀, "Weibersbrunn, Spessart, 4.9.1967", "Bayern, Horstm. leg." (ZSM). – Paratypen: 1♀ ohne Ort aus Coll. Morley (vermutlich GB) (NHML); 1♀ Worms/Rheinland-Pfalz/D, leg. Habermehl (NSF); 1♀ Garmisch/Bayern/D, 700 m, 30.8.1942, aus Coll. E. Bauer (ZSM); 1♀ Rojental/Reschenpass/Südtirol/I, 2200 m, 19.8.1983, leg. Horstmann (HO).

Beschreibung

♀: Kopf und Thorax mit glattem Grund; Schläfen 0,9 mal so breit wie die Augen, hinter den Augen verengt (Abb. 6), mit feinen, stellenweise weit voneinander entfernten Haarpunkten; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Augen kahl; Clypeus etwa so lang wie das Gesicht, von diesem durch eine wenig entwickelte Furche getrennt, im Profil flach, basal mit kräftigen voneinander getrennten Haarpunkten, ohne Querrunzeln, am Apicalrand mit zwei deutlich getrennten spitzen Zähnen; oberer Mandibelzahn etwas größer als der untere; Wangenraum 0,7 mal so breit wie die Mandibelbasis; Fühler 20-gliedrig, das vierte Glied 2,3-2,4 mal so lang wie breit (Abb. 18), Distalhälfte der Geißel etwas keulenförmig, das breiteste Glied 0,9 mal so lang wie breit.

Pronotum lateral zentral auf einer kleinen Stelle sehr zerstreut punktiert oder unpunktiert, sonst zerstreut punktiert, an den Rändern gerunzelt, Epomia deutlich; Mesoscutum überwiegend fein und sehr zerstreut punktiert, Seitenlappen zentral jeweils stellenweise unpunktiert; Mesopleuren außerhalb des großen Speculums zerstreut bis sehr zerstreut punktiert, teilweise im Zentrum unpunktiert; Metapleuren sehr zerstreut punktiert; Beine kräftig, Hinterfemora 3,5-3,7 mal so lang wie hoch; Areola mit dem rücklaufenden Nerven etwas distal der Mitte (etwa wie Abb. 22); Nervellus bei 0,7 kräftig gebrochen, etwas incliv.

Propodeum vollständig gefeldert, in den Feldern kaum strukturiert, Area superomedia 0,5-0,7 mal so lang wie breit (Abb. 29), Area petiolaris wenig eingesenkt, Seitenecken als etwas breitere Leisten, aber nicht spitz vorragend; erstes Gastertergit sehr fein gekörnelt, fast glatt, Dorsalkiele fast bis zu den Stigmen reichend, Dorsolateralleisten bis fast zum Caudalende divergierend; die folgenden Tergite glatt; zweites Tergit 0,7-0,9 mal so lang wie breit; Gaster vom dritten Segment an etwas von der Seite zusammengedrückt; Bohrer schlank, gerade, dorsal am Nodus mit einem zahnartigen Vorsprung, davor mit einem weiteren Zahn, ventral mit feinen Zahnleisten (Abb. 41), Bohrerklappen 1,3 mal so lang wie das erste Gastertergit.

Schwarz; Palpen braun; Mandibeln und Tegulae in der Regel schwarzbraun, selten Mandibeln median rotbraun gezeichnet; drittes bis fünftes Fühlerglied braun überlaufen (variabel); Flügelbasis gelb, Pterostigma dunkelbraun, proximal deutlich aufgehellt, Flügelfläche etwas getrübt; Coxen, Trochanteren, Basis der Vorder- und Mittelfemora und die Hinterfemora dunkelbraun bis schwarz, Vorderfemora zuweilen nicht verdunkelt oder Hinterfemora proximal und distal aufgehellt, Trochantellen rotbraun bis braun, Femora, Tibien und Tarsen sonst hell rotbraun, Hintertibien proximal und

distal schmal verdunkelt, Tarsen distal verdunkelt; zweites bis viertes Gastertergit rotbraun, die folgenden dunkelbraun, caudal schmal gelb gezeichnet, Postpetiolus median-caudal rotbraun gezeichnet.

Holotypus (♀): Kopf 122 breit; Thorax 200 lang, 108 breit (Mesoscutum); Vorderflügel 440 lang; erstes Gastertergit 102 lang; Postpetiolus 42 lang, 52 breit; zweites Tergit 79 lang, 97 breit; Bohrerklappen 130 lang; Körper etwa 570 lang.

♂ unbekannt.

Phygadeuon nitidus Gravenhorst, 1829

Phygadeuon nitidus Gravenhorst, 1829: 708 f. (Aubert 1968: 182). Dem Lectotypus fehlt fast der ganze Bohrer einschließlich der Bohrerklappen. Er stimmt mit 1♀ aus Dalecarlia (= Kopparberg/S) im NRS sehr gut überein; dieses wird zur Interpretation herangezogen. Der Lectotypus trägt die Fundortangabe "Cudowa VIII" (= Kudowa/PL). Das Etikett stammt nicht von Gravenhorst, sondern wurde später zugefügt, vermutlich aufgrund der Beschreibung. Diese nennt aber zwei Fundorte, und es ist unklar, ob dem Schreiber des Etiketts zusätzliche Informationen vorlagen.

Beschreibung

♀: Schläfen etwa so breit wie die Augen, direkt hinter den Augen ein kurzes Stück parallel, zerstreut bis sehr zerstreut punktiert; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Clypeus basal deutlich punktiert, ohne Querrunzeln, apical mit zwei getrennten spitzen Zähnen; Wangenraum 0,7 mal so breit wie die Mandibelbasis; Fühler 19-20-gliedrig, das vierte Glied 2,4-2,7 mal so lang wie breit, Distalhälfte der Geißel etwas keulenförmig, das breiteste Glied 0,9 mal so lang wie breit; Mesopleuren außerhalb des Speculums gleichmäßig zerstreut bis sehr zerstreut punktiert; Hinterfemora 3,5-3,6 mal so lang wie hoch; Area superomedia 0,5-0,6 mal so lang wie breit; zweites Gastertergit glatt, 0,7-0,8 mal so lang wie breit; Bohrer wie bei *P. laevipleuris*, Bohrerklappen 0,9 mal so lang wie das erste Gastertergit (nach 1♀ aus Schweden); Körperlänge 6-7 mm; Geißelbasis gelbbraun bis dunkelbraun überlaufen; Coxen schwarz; Hinterfemora ganz rotbraun; zweites bis drittes oder viertes Gastertergit rotbraun, die folgenden dunkelbraun, caudal schmal gelb gerandet. Eine ausführliche Beschreibung des Lectotypus findet sich bei Frilli (1974: 136 ff.).

Material: 7♀♀, Dalecarlia (= Kopparberg/S) (NRS); ohne Ort aus Coll. Desvignes (vermutlich GB) (NHML); Worms/Rheinland-Pfalz/D (NSF); ? Kudowa/PL (siehe oben) (MPW).

Artengruppe *ponojensis* (Hellén)

Phygadeuon atricolor, spec. nov.

Figs 7, 19, 23, 30, 42

Holotypus: ♀, "Ober-Bayern, Garmisch, Kreuzeckweg bei ca. 900 m. 21.VII.1925. E. Bauer" (ZSM).

Beschreibung

♀: Kopf und Thorax mit glattem Grund; Schläfen so breit wie die Augen, direkt hinter den Augen ein wenig, dann rundlich verengt (Abb. 7), fein und sehr zerstreut punktiert, stellenweise unpunktiert; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Augen kahl; Wangenraum 0,7 mal so breit wie die Mandibelbasis; Clypeus knapp so lang wie das Gesicht, basal deutlich punktiert, apical mit zwei deutlich getrennten spitzen Zähnen; Fühler 20-gliedrig, das vierte Glied 2,7 mal so lang wie breit (Abb. 19), Distalhälfte der Geißel nicht keulenförmig erweitert, Glieder dort wenig länger als breit.

Pronotum lateral überwiegend relativ dicht punktiert, im Zentrum an einer kleinen Stelle unpunktiert, in der Furche gestreift, Epomia deutlich; Mesoscutum fein und sehr zerstreut punktiert, auf den Seitenlappen fast ganz unpunktiert; Mesopleuren außerhalb des großen Speculums fein und sehr zerstreut punktiert, an kleinen Stellen unpunktiert, Metapleuren ähnlich; Beine relativ kräftig, Hinterfemora 3,9 mal so lang wie hoch; Areola höher als breit (Abb. 23); Nervellus bei 0,7 kräftig gebrochen, deutlich incliv.

Propodeum vollständig und deutlich gefeldert, in den Feldern auf glattem Grund stellenweise

zerflossen gerunzelt, Area superomedia 0,7 mal so lang wie breit (Abb. 30), Area petiolaris etwas eingesenkt, Seitenecken als breitere Lamellen, aber nicht spitz vorragend; erstes Gastertergit stellenweise fein gekörnelt und mit feinen Längsrunzeln, Postpetiolus caudal glatt, Dorsalkiele über die Stigmen etwas hinausreichend, Dorsolateralleisten bis fast zum Caudalende divergierend; die folgenden Tergite glatt: zweites Tergit 0,7 mal so lang wie breit; Gaster vom Caudalende des dritten Segments an etwas von der Seite zusammengedrückt; Bohrer gerade, dorsal am Nodus deutlich gewinkelt, ventral mit deutlichen Zahnleisten (Abb. 42), Bohrerklappen 1,6 mal so lang wie das erste Gastertergit.

Schwarz; Palpen gelbbraun; Tegulae schwarzbraun, Flügelbasis gelblich, Pterostigma dunkelbraun, proximal und distal wenig aufgehellt, Flügelfläche klar; an den Vorder- und Mittelbeinen die Trochantellen gelbbraun und dunkelbraun gemustert, die Femora proximal dunkelbraun, median und distal gelbbraun, die Tibien und Tarsen gelbbraun; an den Hinterbeinen auch die Trochantellen und Femora schwarzbraun, die Tibien median breit gelbbraun, proximal und distal schmal verdunkelt, die Tarsen braun; Gaster hinter dem ersten Segment rotbraun, die hinteren Tergite unbestimmt braun überlaufen, caudal gelb gerandet.

Holotypus (♀): Kopf 121 breit; Thorax 204 lang, 110 breit (Mesoscutum); Vorderflügel 495 lang; erstes Gastertergit 100 lang; Postpetiolus 47 lang, 55 breit; zweites Tergit 77 lang, 104 breit; Bohrerklappen 157 lang; Körper 600 lang.

♂ unbekannt.

Phygadeuon camargator Aubert, 1982, stat. nov.

Phygadeuon (Iselix) nitidus Gravenhorst *camargator* Aubert, 1982: 35.

Beschreibung

♀: Schläfen knapp so breit wie die Augen, direkt hinter den Augen kaum, caudal deutlich verengt, fein und sehr zerstreut punktiert, kleine Bereiche unpunktiert; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Clypeus basal fein und dicht, subbasal kräftig und sehr zerstreut punktiert, apical mit zwei relativ stumpfen Zähnen; Wangenraum 0,9 mal so breit wie die Mandibelbasis; Fühler 25-gliedrig, das vierte Glied 2,6 mal so lang wie breit, Distalhälfte der Geißel nicht deutlich keulenförmig, Glieder im distalen Drittel der Geißel etwa so lang wie breit; Mesopleuren außerhalb des Speculums deutlich und mäßig dicht punktiert, ventral relativ dicht punktiert und etwas punktrissig; Hinterfemora 3,8 mal so lang wie hoch; Area superomedia 0,7 mal so lang wie breit; zweites Gastertergit glatt, breiter als lang; Bohrer wie bei *P. atricolor*, Bohrerklappen 0,9 mal so lang wie das erste Gastertergit; Körperlänge etwa 6 mm; Fühler und Coxen schwarz; Hinterfemora proximal und median schwarzbraun, dann rotbraun, das äußerste Distalende schwarz; zweites bis viertes und dazu die Frontalhälfte des fünften Gastertergits rotbraun, die folgenden schwarzbraun, caudal gelb gerandet.

Material: 1♀, Sylvéréal/Bouches-du-Rhône/F (Coll. Aubert/MZL).

Phygadeuon macrocephalus, spec. nov.

Figs 8, 20, 31, 43

Typen. Holotypus: ♀, "Ober-Bayern, Garmisch, 700 m, 25.VII.1940. G. Thelemann" (Coll. E. Bauer/ZSM). – Paratypus: 1♀ vom gleichen Ort, Fangdatum 26.8.1950, leg. E. Bauer (ZSM).

Beschreibung

♀: Kopf und Thorax mit glattem Grund; Schläfen 1,2 mal so breit wie die Augen, direkt hinter den Augen ein wenig erweitert (Abb. 8), sehr zerstreut punktiert, stellenweise unpunktiert; Scheitel nach dorsal deutlich über das Niveau der Ocellen vorragend; Augen kahl; Clypeus wenig länger als das Gesicht (dieses auffällig kurz), basal kräftig punktiert, apical mit zwei voneinander getrennten spitzen Zähnen; Wangenraum 0,5 mal so breit wie die Mandibelbasis; Fühler 20-gliedrig, das vierte Glied 2,2 mal so lang wie breit (Abb. 20), Distalhälfte der Geißel wenig keulenförmig erweitert, Glieder dort etwa so lang wie breit.

Pronotum lateral kräftig und dicht punktiert, in der Furche gerunzelt, Epomia deutlich; Mesoscutum sehr zerstreut punktiert, Seitenlappen zentral jeweils an kleinen Stellen unpunktiert; Mesopleuren außerhalb des großen Speculums deutlich, aber zerstreut bis sehr zerstreut punktiert; Metapleuren deutlich und relativ dicht punktiert; Beine kräftig, Hinterfemora 2,8 mal so lang wie hoch; Areola regelmäßig oder mit dem rücklaufenden Nerven etwas distal der Mitte (variabel); Nervellus bei 0,7 kräftig gebrochen, deutlich incliv.

Propodeum vollständig, aber relativ fein gefeldert, in den Feldern auf glattem Grund zerflossen punktiert, nur die vorderen Seitenfelder fast glatt, Area supromedia 0,8-0,9 mal so lang wie breit (Abb. 31), Area petiolaris wenig eingesenkt, Seitenecken als breite Lamellen, aber nicht spitz vorragend; erstes Gastertergit fein gekörnelt, kaum gestreift, Dorsalkiele fein, knapp bis zu den Stigmen reichend, Dorsolateralleisten bis fast zum Caudalende divergierend; die folgenden Tergite glatt; zweites Tergit 0,6-0,7 mal so lang wie breit; Gaster vom Caudalende des dritten Tergits an etwas von der Seite zusammengedrückt; Bohrer gerade, dorsal am Nodus deutlich gewinkelt, ventral mit deutlichen Zahnleisten (Abb. 43), Bohrerklappen 1,3-1,4 mal so lang wie das erste Gastertergit.

Schwarz; Palpen gelbbraun; Mandibeln median gelbbraun überlaufen; drittes bis fünftes Fühlerglied rotbraun (teilweise etwas dunkel überlaufen); Tegulae rotbraun bis dunkelbraun, Flügelbasis hellgelb, Pterostigma dunkelbraun, proximal und distal schmal weißlich, Flügelfläche klar; Coxen schwarzbraun, apical aufgehellt; Trochanteren dunkelbraun und gelbbraun gemustert; Beine sonst hell rotbraun, Hintertibien proximal und distal und Hintertarsen dunkelbraun gezeichnet; zweites, drittes und die Basis des vierten Gastertergits rotbraun, die folgenden dunkelbraun, caudal gelb gerandet.

Holotypus (♀): Kopf 122 breit; Thorax 206 lang, 102 breit (Mesoscutum); Vorderflügel 470 lang; erstes Gastertergit 91 lang; Postpetiolus 44 lang, 50 breit; zweites Tergit 75 lang, 111 breit; Bohrerklappen 124 lang; Körper etwa 630 lang.

♂ unbekannt.

Phygadeuon oporinus Horstmann & Yu, 1999

Phygadeuon autumnalis Schmiedeknecht, 1905: 673 und 699 (Horstmann 1990: 49 f.) – praeocc. durch *Phygadeuon autumnalis* Provancher, 1882.

Phygadeuon oporinus Horstmann & Yu, 1999: 80 – nom. nov. für *Phygadeuon autumnalis* Schmiedeknecht, 1905.

Beschreibung

♀: Schläfen wenig breiter als die Augen, direkt hinter den Augen nicht, dann rundlich verengt, fein und sehr zerstreut punktiert, stellenweise unpunktiert; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Clypeus basal deutlich zerstreut punktiert, apical mit zwei feinen, deutlich getrennten Zähnen (entgegen der Angabe von Schmiedeknecht, l. c.); Wangenraum 0,8 mal so breit wie die Mandibelbasis; Fühler 20-21-gliedrig, das vierte Glied 2,4-2,7 mal so lang wie breit, Distalhälfte der Geißel nicht keulenförmig erweitert, Glieder dort so lang wie breit oder wenig breiter als lang; Mesopleuren im Zentrum glatt, an den Rändern fein zerstreut punktiert; Hinterfemora 3,7-3,8 mal so lang wie hoch; Area superomedia 1,0-1,2 mal so lang wie breit; zweites Gastertergit glatt, 0,7 mal so lang wie breit; Bohrer wie bei *P. atricolor*, Bohrerklappen so lang wie das erste Gastertergit; Körperlänge etwa 5 mm; Geißelbasis mehr oder weniger stark gelbbraun überlaufen; Coxen rot, Hintercoxen basal verdunkelt; Hinterfemora rotbraun; zweites und drittes Gastertergit gelbbraun, die folgenden bräunlich (variabel).

Material: 3♀♀, Thüringen/D (NMW, SMNS).

Phygadeuon ponojensis (Hellén, 1967)

Phyzelus ponojensis Hellén, 1967: 94 (Horstmann 1975: 104).

Beschreibung

♀: Schläfen 0,9 mal so breit wie die Augen, direkt hinter den Augen deutlich verengt, fein und zerstreut punktiert; Scheitel nach dorsal nicht über das Niveau der Ocellen vorragend; Clypeus basal kräftig zerstreut punktiert, apical mit zwei kleinen Zähnen; Wangenraum 0,9 mal so breit wie die Mandibelbasis; Fühler 20-gliedrig, das vierte Glied 2,4 mal so lang wie breit, Distalhälfte der Geißel kaum keulenförmig erweitert, Glieder dort 1,1 mal so lang wie breit; Mesopleuren außerhalb des Speculums fein und sehr zerstreut punktiert; Hinterfemora 3,4 mal so lang wie breit; Area superomedia 0,8 mal so lang wie breit; zweites Gastertergit glatt, 0,7 mal so lang wie breit; Bohrer wie bei *P. atricolor*, Bohrerklappen 1,5 mal so lang wie das erste Gastertergit; Körperlänge etwa 4 mm; Geißelbasis rotbraun; Coxen und Hinterfemora schwarz; zweites bis viertes Gastertergit rotbraun, die folgenden dunkelbraun, caudal gelb gerandet.

Material: 1♀, Ponoj (= Ponoi/Kola/Russia) (ZMH).

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29. Taxonomic Atlas of the Benthic Fauna of the Santa Maria Basin and Western Santa Barbara Channel. Vol. 8: Mollusca, Part 1 (1998/2000), Vol. 9: Mollusca, Part 2 (1996). – Santa Barbara Museum of Natural History, Santa Barbara, CA. ISBN 0-936494-21-2 (14 Volume Set). vii + 250 pp. and vii + 228 pp.

The Santa Maria Basin and Western Santa Barbara Channel is a remarkable biogeographic region of the Eastern Pacific with a long tradition in faunistics particularly concerning malacology. The two volumes provide a very valuable compilation of the molluscan fauna of this important area elaborated by specialists of the respective taxa. The chapter on the two aplacophoran classes also includes the formal description of no less than five (six) species new to science; unfortunately these are solely based on hard parts and external morphology, thus the systematic position of the two solenogastres species remains somewhat tentative. Also two new bivalve and seven new gastropod species are formally described. Clear identification keys are provided and accurate descriptions and (mostly black & white) figures of nearly all species included are presented. Several "*Genus* sp." in all molluscan classes demonstrate that more work is necessary for a complete inventory of the Santa Barbara species, a hopefully stimulating tool for professional scientists or skilled amateurs.

Strength of the two volumes lies in the detailed data on synonyms, the material examined by the authors, and the location of types of the respective species, reflecting the immense value of accurate museum collections. I found the extensive reference list of each chapter very complete and accurate as is the index of each part. The extensive glossary will certainly help beginners and students. Figures and printing are of medium quality, but this is acceptable, since it is reflected by a low price, which makes the two volumes available for a broad readership. No doubt that the "Atlas" will prove its value in the future of biodiversity research in the Santa Maria Basin and Western Santa Barbara Channel and may serve as a core of further Eastern Pacific taxonomic initiatives.

G. Haszprunar

30. Harper, E. M., J. D. Taylor & J. A. Crame (Eds.): Evolutionary Biology of the Bivalvia. – Geological Society Special Publication 177, 2000. – ISBN 1-86239-076-2 (hbk), ISSN 0305-8719. Alden Press, Oxford, vii + 494 pp.

This volume includes the proceedings of *The Biology and Evolution of the Bivalvia* meeting held in Cambridge in September 1999. Accordingly, my first congratulation to the editors and authors because they have succeeded to produce this multiauthor book within a year. Three main topics are concerned: (1) Molecular phylogeny of the Bivalvia and its subgroups. Two teams once more demonstrate that available sequence data lead to reasonable results within the major taxa but largely fail to clear up the interrelationships of the major groups or monophyly or the sister-group of the Bivalvia as a whole. (2) Several articles concern various aspects of the extensive bivalve fossil record, and phylogenetic as well as functional considerations are presented. (3) Also morphological data based on electron microscopy or functional anatomy still contribute significantly to our understanding of bivalve phylogeny and evolution aside from eco-functional aspects – if well elaborated and analysed. I particularly appreciate the obvious interaction of all three fields mentioned in the various discussion parts; this makes the present volume a very well-done and important source of information on the current state of the art of phylogeny and evolutionary history of the Bivalvia. Also price and content have a reasonable relation; thus, if you are interested in bivalves – go and buy this book.

G. Haszprunar

31. Magerl, C. & D. Rabe (Hrsg.): Die Isar. Wildfluss in der Kulturlandschaft. – Verlag Kiebitz Buch, Vilsbiburg, 1999, Großformat, geb., 192 S., viele Farb- und sw. Fotos. ISBN 3-9804048-5-4.

Der Fluss vor unserer Haustür: gezähmt oder wild, Erholungslandschaft oder Kloake? Eine Vielzahl von Autoren beleuchtet die Isar von allen Seiten: Flößer, Energiewirtschaft, Landschaftsplanung und Renaturierung, Fische, Botanik, Auwälder, die geschützten Abschnitte, die wichtigsten Städte, das Erholungspotential und nicht zuletzt die Vogelwelt, alles in 43 Kleinkapiteln dargestellt und von unserem AIB-Redakteur mit herausgebracht. Das Buch bestecht weniger durch den Text, der aber genügend und korrekte Sachinformation liefert, als durch die schönen Farbfotos, die Heimatliebe erwecken, wobei oft historische Vergleiche, garniert mit seltenen Schwarzweiß-Dokumenten, herbeigezogen werden.

Über die Vögel der Isarstauseen lassen sich M. Schötz und für Ismaning U. & P. Köhler aus, die auch die Problematik des zu sehr gereinigten Isarwassers für das Fortbestehen des Speichersees als Ramsargebiet erläutern.

Der Band wurde nach dem Pfingsthochwasser 1999 geschrieben, und es scheint, als hätten die Behörden dazugelernt, denn Baumaßnahmen zur Rück(?)führung in einen naturnahen Zustand sind allenthalben unterwegs. Bleibt zu hoffen, dass davon unsere Raritäten wie auch die Artenvielfalt profitieren können. Als Geschenkband und Diskussionsgrundlage gut geeignet.

T. Mischler

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Araucoscia Verhoeff, 1939 is a juniour synonym of *Pseudophiloscia* Budde-Lund, 1904

(Crustacea, Isopoda, Oniscidea)

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The two philosciid genera *Araucoscia* Verhoeff, 1939 and *Pseudophiloscia* Budde-Lund, 1904, both recently reexamined by their type material have to be considered synonyms. New material from Chile, where both genera were reported from, is attributed to *Pseudophiloscia inflexa* Budde-Lund, 1904. The characters found in this species match the characters found in *Araucoscia*. Thus, *Araucoscia* is considered a juniour synonym of *Pseudophiloscia*.

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Introduction

There are only few species of terrestrial isopods reported from Chile, among them some genera and species representing the evolutionary level of the philosciid facies. These genera are *Araucoscia* Verhoeff, 1939 and *Pseudophiloscia* Budde-Lund, 1904, both were subject to a reexamination of the type material (Leistikow 1998 a, b). For both taxa, autapomorphies were found but it appeared that the boundaries of *Araucoscia* were more restrictive than those of *Pseudophiloscia* and the suspicion arose that *Arausoscia* might be included in *Pseudophiloscia* (Leistikow 1998b). New material from Isola Wellington off the coast of southern Chile revealed the fact that the slight differences are even more inconspicuous to consider both species members of different genera. Moreover, some amendments to the diagnosis of *Pseudophiloscia* Budde-Lund, 1904 shall be given, particularly with respect to the mouth parts and noduli laterales, the diagnosis has to be expanded.

For the Museo Zoologico della Università Firenze, the acronym MZUF is used.

Systematic section

Pseudophiloscia Budde-Lund, 1904

Paraphiloscia Stebbing, 1900 in part
Araucoscia Verhoeff, 1939

Diagnosis. Cephalothorax with linea supra-antennalis, no linea frontalis and only slight lateral lobes, compound eye with 15 ommatidia, pleon retracted from pereon. Antennula three-articulate, antennal flagellum three-articulate, apical bristle shorter than distal article, with moderately long free sensilla inserting basally. Mandible bearing molar penicil consisting of 10 branches, each arising separately, lacinia mobilis of left side bulky, lateral endite of maxillula with up to 10 simple teeth, medial endite

without apical point, maxilla with lateral lobe three times broader than medial one, maxilliped with endite lacking knob-like penicil, basipodite with sulcus lateralis.

Pereopods slender, inner claw of dactylus short, dactylar seta simple, carpal antenna-grooming brush distinct, ornamental sensory spine with handlike apex, coxal plates narrow, lacking sulcus marginalis and gland pores, three rows of noduli laterales, on coxal plate VII, five noduli laterales. Pleopods without respiratory areas, lateral margin bearing sensory spines, male endopodite of pleopod 1 acute. Uropod with lateral groove, endopodite inserting proximally of exopodite.

Species included: *Pseudophiloscia inflexa* Budde-Lund, 1904, *P. angusta* (Dana, 1852), *P. chilenica* (Verhoeff, 1939) comb. nov.

Pseudophiloscia inflexa Budde-Lund, 1904
Figs 1-5

Material examined. 1♂, 1♀, Chile, Isola Wellington, Puerto Eden, leg. Daccordi, 12.2.1988, MZUF no. 3183; Microscopic slides of 1♂ same data as above.

Additions to description

The species was described by Budde-Lund (1904), figuring some of the mouth parts and the habitus, a re-examination of the syntypes was performed by Leistikow (1998b). Since the material was incomplete to some extent, information on the characters not observed will be given:

Colour. Dorsally chestnut with light spots, on coxal plates two light areas separated by darker chestnut, paramedian line darker than remaining tegument, cephalothorax chestnut with small light spots, pereopods chestnut, pleopods light yellowish brown.

Pereon. Tegument shiny, covered with slender tricorn-like setae, three noduli laterales on coxal plates I-VI, coxal plate VII bearing five noduli laterales, four along the distal margin, the most medial one in paramedian position on pereonite (Figs 1, 4)

Antenna. Apical bristle as long as distal flagellar article, free sensilla near basis almost as long as apical bristle (Fig. 3)

Maxillula. Medial endite rather bulbous, subapical tip very inconspicuous, penicils stout, lateral endite with a small tooth paralaterally on rostral surface (Fig. 5).

Pereopods. Male pereopod 7 with small setose area on ischium (Fig. 2).

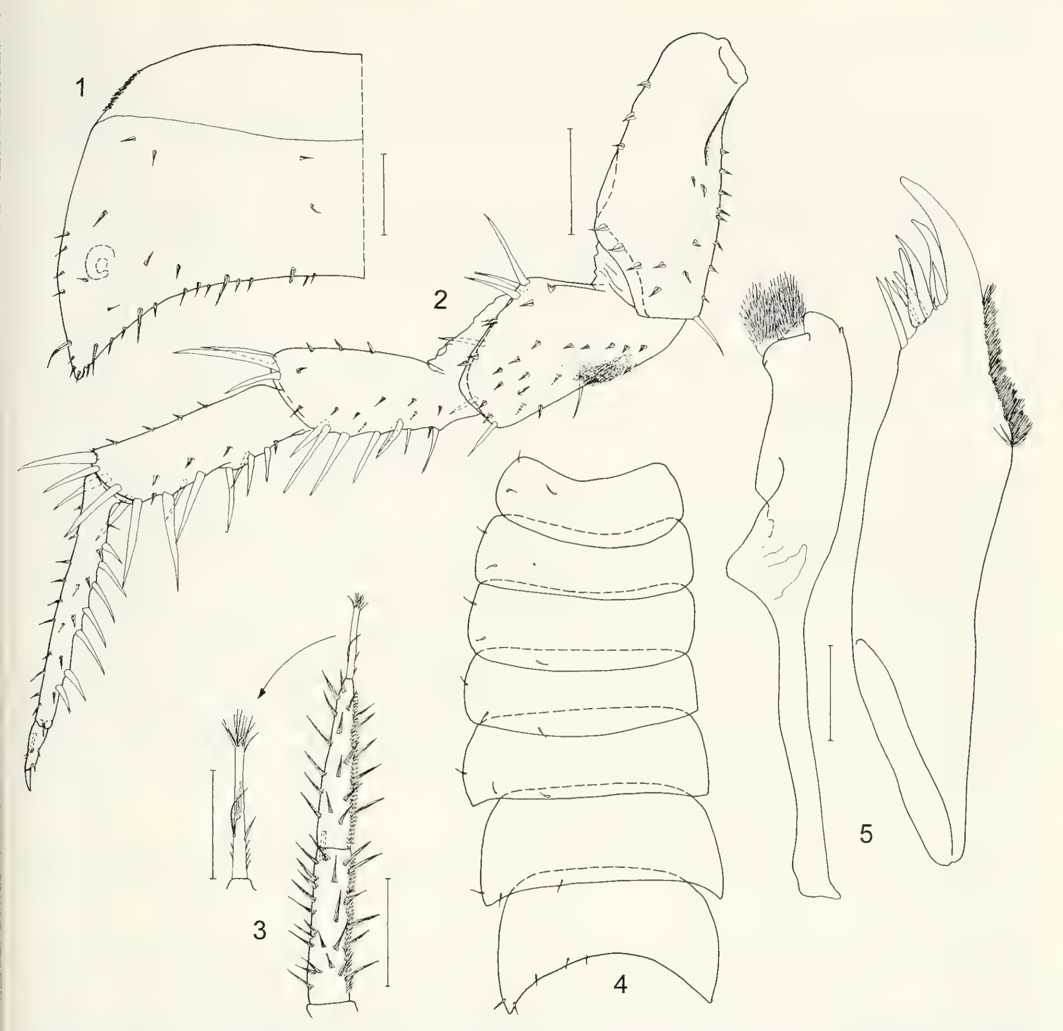
Discussion. As stated previously (Leistikow 1998a, b), the three species *Araucoscia chilenica* Verhoeff, 1939, *Pseudophiloscia angusta* (Dana, 1852) and *P. inflexa* Budde-Lund, 1904 form a monophyletic group characterized by the following autapomorphies:

- Two rows of noduli laterales per side [only one row of noduli laterales per side]
- Coxal plates very narrow [coxal plates of normal breadth]
- Coxal plates without sulcus marginalis [coxal plates with sulcus marginalis]
- Lateral endite of maxillula with about ten simple teeth not fitting the 4+6-pattern [maxillula with 4+6 teeth, five of inner set cleft]

The inclusion of the species *chilenica* into the genus *Pseudophiloscia* Budde-Lund, 1904 aims at the establishment of a monophylum separated from other so-called genera by a gap in character states, i.e., the traditionally accepted characters for the characterisation of genera (Taiti & Ferrara 1980) should unite species in monophyletic taxa, called genera, which are separated from other genera by distinct character states not allowing a continuum from one character state to another. Consequently, all the species of "philosciid" Oniscoidea bearing the above mentioned characters are placed in *Pseudophiloscia*. The slight differences in the morphology of the maxillula are only of interest on the species level.

Acknowledgements

The author is indebted to Prof. Dr. T. Bartolomaeus for the possibility to use the facilites of the department of zoomorphology. Thanks are to Dr. S. Taiti and Dr. F. Ferrara for the providance with the new material of *Pseudophilsocia inflexa.*



Figs 1-5. *Pseudophiloscia inflexa* Budde-Lund, 1904, male mounted on microsopic slides. **1.** Coxal plate VII, scale bar = 400 μm. **2.** Male pereopod 7, rostral view, scale bar = 400 μm. **3.** Articles 2 and 3 of antennal flagellum with detail of apical organ, scale bar = 200 μm and 100 μm, respectively. **4.** Scheme of position of noduli laterales. **5.** Maxillula in rostral view, scale bar = 100 μm.

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Schulze, G.: Die Schweinswale. Familie Phocoenidae. – Westarp-Wiss., Magdeburg. 2. überarb. Aufl., 1996. (Die Neue Brehm-Bücherei; Bd. 583). 191 S., 114 Abb., 4 Tab. ISBN 3-89432-379-5.

Wagenknecht, E.: Der Rothirsch. Cervus elaphus. – Westarp-Wiss., Magdeburg; Spekrum Akad. Verl., Heidelberg. 3. überarb. Aufl., 1996. (Die Neue Brehm-Bücherei; Bd. 129). 156 S., 50 Abb., 6 Tab., 1 Farbtaf. ISBN 3-89432-500-3.

Die "Neue-Brehm-Bücherei", ehemals vom Ziemsen-Verlag in Wittenberg-Lutherstadt herausgegeben, schien nach Wende und Wiedervereinigung zum Untergang verurteilt. Dem Verlag Westarp Wissenschaften ist es zu verdanken, dass die bewährte Reihe nun doch bestehen bleibt. Einige ältere Bände wurden seither neu aufgelegt, teilweise in neuer Bearbeitung, in jedem Fall aber in etwas größerem Format und in besserer Druckqualität.

Der Band über die Schweinswale entspricht inhaltlich bis auf geringe Ergänzungen der 1. Auflage aus dem Jahr 1986, doch wurden die Zahl der Abbildungen vermehrt. Das Buch über die Murmeltiere wurde dagegen völlig neu konzipiert und wesentlich erweitert. Dabei wurden insbesondere neuere Originalarbeiten des Autors über die Soziobiologie und Ethökologie zentralasiatischer Murmeltierarten berücksichtigt. Die Abbildungen der ersten Auflage, die von relativ schlechter Qulaität waren, wurden durch wesentlich bessere Aufnahmen ersetzt.

Inwieweit sich der Band über den Rothirsch von der verhergehenden Auflage unterscheidet, kann der Rezensent nicht beurteilen, da ihm diese nicht zur Verfügung stand. Doch scheint zumindest das Literaturverzeichnis nicht wesentlich aktualisiert worden zu sein und enthält überwiegend ältere Arbeiten.

Die Neuauflagen folgen dem bewährten Konzept der Reihe, dem Leser eine kompakten, aber wissenschaftlich seriösen Überblick über eine Tierart oder –gruppe zu geben, wobei die Ergebnisse der verschiedenene biologischen Teildisziplinen – Morphologie, Anatomie, Physiologie, Ethologie und Tiergeographie – berücksichtigt werden.

Die wesentliche Verbesserung von Druckqualität, Format und Ausstattung ist in jedem Fall zu begrüßen, zu kritisieren ist allerdings der relativ hohe Preis. R. Kraft

33. Eisenberg, J. F. & K. H. Redford: Mammals of the Neotropics. Vol. 3: The Central Neotropics: Ecuador, Peru, Bolivia, Brazil. – The University of Chicago Press Chicago and London 1999. 609 S., zahlr. Abb. u. Tab. ISBN 0-226-19541-4.

Mit dem vorliegenden dritten Band wird eine vielbeachtete Handbuchreihe über die Säugetiere der Neotropis abgeschlossen. Nachdem in den beiden vorangegangenen Bänden (erschienen 1989 bzw. 1992) die nördlichen bzw. südlichen Staaten dieser Faunenregion behandelt wurden, umfaßt der Geltungsbereich diesmal die in der Mitte des südamerikanischen Kontinents gelegenen Staaten Ecuador, Peru, Bolivien und Brasilien. Auch die Säugetiere der Galapagos-, Falkland- und anderer Inseln sind eingeschlossen. Der Aufbau entspricht weitgehend dem der ersten beiden Bände: Im Hauptteil werden Merkmale, Verbreitung, Lebensraum und Lebensweise der einzelnen Arten beschrieben. Verbreitungskarten, Skizzen mit Schädel- und Zahnmerkmalen sowie Farbtafeln mit Habituszeichnungen ergänzen den Text. Zu jeder Ordnung gibt es ein umfangreiches Literaturverzeichnis. Besondere Erwähnung verdienen die einleitenden Kapitel über fossile Säugerfaunen Brasiliens und Perus. Sie zeigen sehr anschaulich, wie sich die neotropische Säugetierfauna im Verlauf von Tertiär und Quartär aus autochthonen und allochthonen Elementen zusammengesetzt hat und tragen dadurch wesentlich zum Verständnis ihrer Komplexität und ihres Artenreichtums bei. Ein abschließender Teil behandelt aktuelle ökologische und populationsbiologische Themen. Insbesondere Biodiversität und Gefährdungsgrad neotropischer Lebensräume werden hier angesprochen.

Die dreibändige Reihe ist das Ergebnis jahrzehntelanger Literatur- und Feldstudien der beiden Autoren. Entsprechend informativ und authentisch sind die Angaben. Es ist überaus zu begrüßen, daß nun – erstmals seit dem nicht mehr ganz aktuellem Standardwerk von CABRERA & YEPES aus dem Jahr 1960 – ein vollständiges, übersichtlich gegliedertes und zudem sehr ansprechend gestaltetes Kompendium der süd- und mittelamerikanischen Säugetierfauna vorliegt – und dies zu einem erstaunlich günstigen Preis. R. Kraft

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Contribution to the taxonomy of European Poronota I. *Oribatella* and *Anachipteria*

(Acari, Oribatida)

Gerd Weigmann

Weigmann, G. (2001): Contribution to the taxonomy of European Poronota (Acari, Oribatida) I. *Oribatella* and *Anachipteria*. – Spixiana **24/3:** 235-240

In the slide collection of Oribatida from Carl Willmann and from L. Kneissl, stored in the Zoologische Staatssammlung in Munich, some species have been found which need to be revised. One of this slides refer to "*Oribatella meridionalis*" (det. Willmann); the revision of it resulted in synonymization with *Oribatella superbula* (Berlese, 1904). A related new species from Germany, *Oribatella similesuperbula*, spec. nov. is described. Further on a slide with the lable "*Tectoribates latitectus*" (det. Willmann) turned out to be a new species, described as *Anachipteria dubia*, spec. nov., which is compared with *A. howardi* Berlese, 1908, the senior synonym of *A. latitectus* Berlese, 1908.

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Introduction

Within revisional studies on central european Oribatida some new species have been found; in some further species the older descriptions need some additions to be comparable with modern ones. This contribution deals mainly with material from the Willmann collection in the Zoologische Staatssammlung in Munich. A slide with "*Oribatella meridionalis* Berlese, 1908" has been reexaminated in the light of a revisional publication of Berlese's *Oribatella* species (Bernini 1975), the nomen novum *O. willmanni* Subias & Gil-Martin, 1995, for this slide material, and a closely related german species with similar characters, *Oribatella similesuperbula*, spec. nov.

A second part of this contribution deals with "*Tectoribates latitectus* (Berlese, 1908)" in the sense of Willmann (1931), belonging to *Anachipteria* in modern taxonomy. All european collections of this american species and the related *A. howardi* need to be reexaminated. Willmann's material does not belong to Berlese's species and is described as *Anachipteria dubia*, spec. nov., below.

Oribatella superbula (Berlese, 1904)

According to the revision by Bernini (1975) the italian species *Oribatella meridionalis* Berlese, 1908, is a junior synonym of *O. superbula* (Berlese, 1904). Willmann (1931) illustrated an "*O. meridionalis*" in his keys in the group of species with 3 claws. But the reexamination of his slide brougth the result that the two mounted specimens from italian origin have 2 claws, indeed, as described for *superbula*. In fig. 1a the dorsal aspect of one of the mounted specimens is presented, the claws of legs are sketched, only. As far as visible the ventral characters agree with *O. superbula* after Bernini (1975). It seems that Willmann did not collect "*O. meridionalis*" in Germany, himself, but he gave the diagnosis after Sellnick

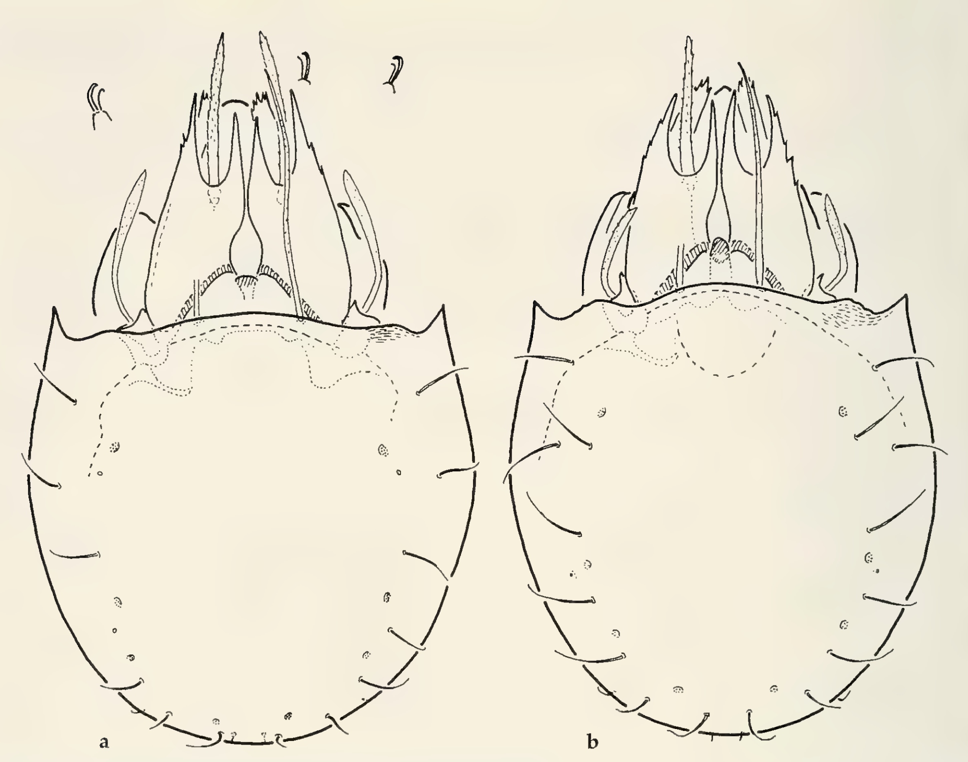


Fig. 1a. *Oribatella superbula* (Berlese), dorsal aspect with indication of the claws (slide of Willmann collection, Munich). **b.** *Oribatella similesuperbula*, spec. nov., dorsal aspect.

(1928), who notes no origin of his material. Cited by Bernini (1975), in Southern France a 2-clawed "*O. meridionalis*" has been found by Lions (1972). All these specimens refer to *O. superbula*.

In Spain one specimen of *Oribatella* has been found and cited by Subias & Gil-Martin (1995) that resembles *O. superbula* in the sense of Bernini (1975), but it differs by legs with 3 claws each. Subias & Gil-Martin assumed that the specimen must be identical with Willmann's "3-clawed *O. meridionalis*", and therefore it was renamed as "*O. willmanni* Subias & Gil-Martin, 1995" whithout further details. But, as reported above, Willmann's specimens of "*O. meridionalis*" have 2 claws and origin from Italy, and they belong to *O. superbula*. The spanish *Oribatella* is a species inquirenda; the nomen novum for Willmann's *O. meridionalis* is based on the erroneous assumption that Willmann's specimens would have 3 claws at the legs, also. In the following, the description of a new species from Germany with 3 claws at the legs is presented which is related to *O. superbula*.

Oribatella similesuperbula, spec. nov.

Figs 1b, 2a-c

Diagnosis. Small body size, length about 320-380 μm. Prodorsum with interlamellar tubercle; cuspis of lamella with long internal and external spicular teeth. Sensillus long and only scarcely fusiform thickened. Rostral border with 2 small lateral teeth, in the middle undulating. Epimeral setation formula normal (3-1-3-3); *4c* very strong and moderately prolonged, *3c* moderately strong and prolonged; other setae thin. Legs with 3 claws.

Description

General characters. Total body length (without lamellae and tutoria) of females 340-380 μm, males 320-340 μm. Colour reddish-brown, cuticle smooth.

Prodorsum. Frontal border of rostrum with no real incision, between small lateral teeth the border

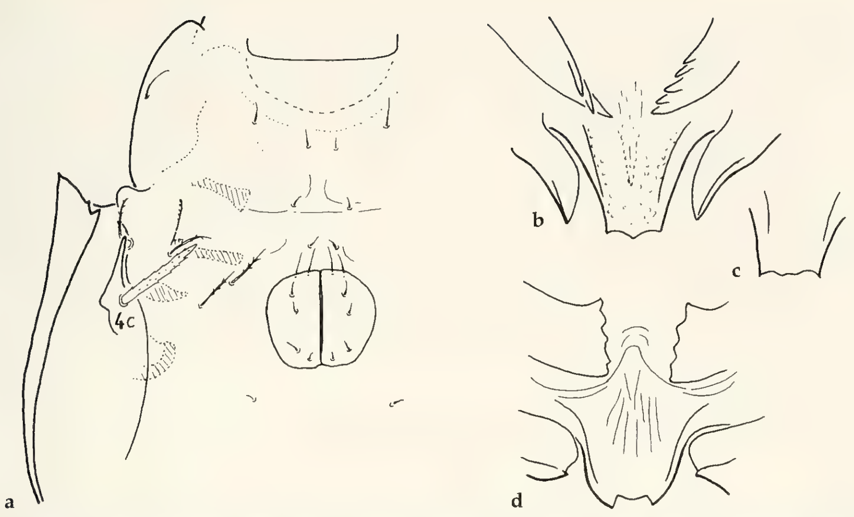


Fig. 2a. *Oribatella similesuperbula,* spec. nov., epimeral region. **b.** rostrum with genal teeth and tutorial tips in dorso-frontal aspect. **c.** rostrum of an other specimen. **d.** *Oribatella superbula* (Berlese), rostrum with genal teeth and tutorial tips in dorso-frontal aspect (after Bernini 1975).

has two or three incurvations (Figs 2b, c); dorsal part of rostrum with carina. Normal shape of lamellar cuspis: inner cuspis teeth mostly shorter than outer teeth, the latter at the lateral side with 0-3 little teeth; with small interlamellar ("translamellar") tubercle between the cuspides; lamellar and interlamellar setae long and strong. Sensillus thick setiform (Fig. 1b). Tutorium long and broad, with distal teeth, as usually (Fig. 2b). Genal teeth not very broad (smaller than in *O. superbula*). Rostral setae long, with setulae. Pedotectum I very large.

Notogaster. Cuticle smooth with fine puncture, with striation at the anterior part of the pteromorphs. 10 pairs of granulated notogastral setae of moderate length, anterior setae up to 35 μm, 2 pairs at the posterior border very small; 4 pairs of small areae porosae; pteromorphs of normal form, as typical in the genus (Fig. 1b).

Ventral region. Epimeral region (Fig. 2a) with the usual setation 3-1-3-3. Some setae short and thin (*1a, 1b, 2a,* 3a*)*; others longer and thin (*1c, 3b, 4a, 4b*); *3c* longer and moderately thick, *4c* thick and prolonged, about 40 μm, reaching to the apodeme between epimers II and III. Aggenital setae of normal small size, as 6 pairs of genital setae, 3 pairs of adanal setae and 2 pairs of anal setae.

Legs. All legs with 3 claws (heterotridactyl). Genu I with ventral tooth, genu IV without tooth.

Origin of the specimens. (1) Some specimens have been found by the author in moss and decaying wood of a trunk. Forest near Milseburg, Rhön Mountains, Germany; sample 813, date 4.6.1994. The type and a syntype is deposited in Zoologische Staatssammlung, Munich. Further specimens are in the collection of the author. (2) Three slides in the Kneissl collection, stored in Zoologische Staatssammlung in Munich, belong to this species, most probably. The specimens in the slides "*Oribatella berlesei*" K1194, K1195 and K1196 are damaged, but the visible details refer to the new species. Origin is Oberalting, Bavaria, leg. Kneissl 7.8.1910 from decaying wood ("Mulm").

Discussion: *O. similesuperbula,* spec. nov. is closest related to *O. superbula.* Common characters are: anterior border of rostrum small, without pad; strong epimeral setae *3c* and *4c;* middle body size. Main differences are: legs with three claws (*superbula* with 2 claws); seta *4c* of epimers (Fig. 2a) less prolonged than in *superbula,* in which the seta *4c* reaches the apodeme between epimers I and II; genal teeth smaller; frontal border of rostrum undulated (Figs 2b, c; with incision in *superbula*: fig. 2d); body length somewhat larger with 320-380 μm (in *superbula* 290-350 μm).

At today's knowledge the 3-clawed spanish species *Oribatella willmanni* Subias & Gil-Martin, 1995 must not be identical with *O. similesuperbula,* spec. nov. and it requires careful reexamination (cf. discussion in the section on *O. superbula*). But, in the case of specific identity the name *O. willmanni* would be senior synonym of *O. similesuperbula,* spec. nov.

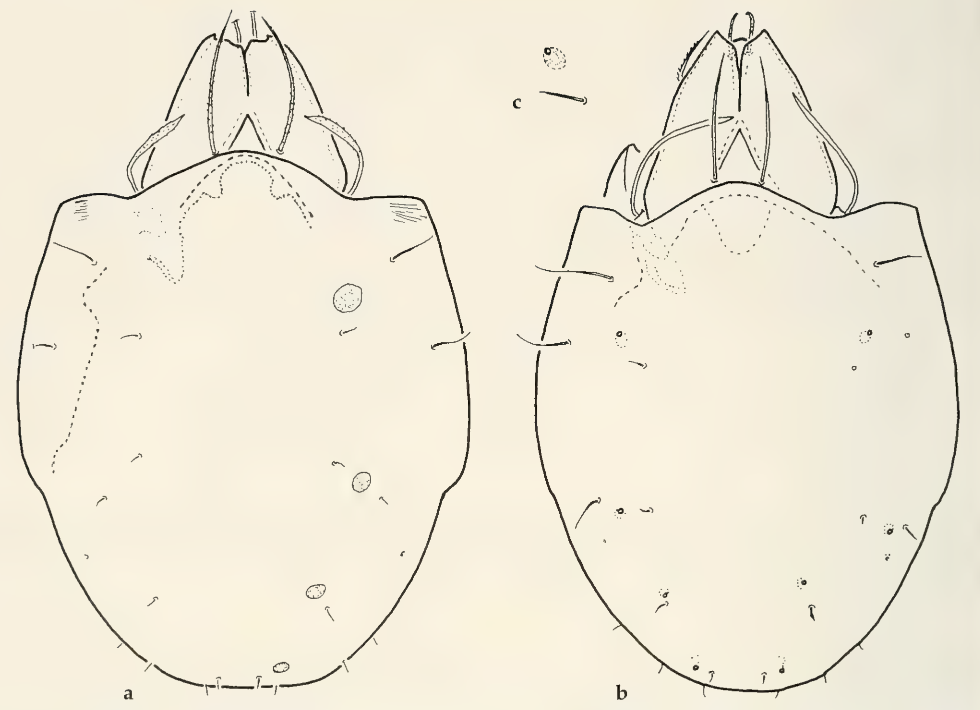


Fig. 3a. *Anachipteria howardi* (Berlese), dorsal aspect of a syntype, Berlese collection (after Norton & Kethley 1989). **b.** *Anachipteria, dubia* spec. nov., dorsal aspect. **c.** Sacculus *Sa* with notogastral seta.

Anachipteria howardi (Berlese, 1908) and *A. latitecta* (Berlese, 1908)

The taxonomical literature on *Anachipteria* presents a confusing picture. There are different opinions on the definition of the families Achipteriidae and Oribatellidae. The *Anachipteria* species have been put into the family Oribatellidae by some authors (cf. Perez-Iñigo 1993; see discussion in Bernini 1973), partly as *Tectoribates* species, because *Anachipteria,* in contrast to other achipteriid genera, lacks the knifelike anterior projection at the pteromorph. On the other hand, the morphology of the lamellar complex and the tutoria are more or less the same than those in typical achipteriid genera, as *Achipteria, Parachipteria* and *Pseudachipteria,* which have the typical knifelike anterior projection at the pteromorph. The systematic position seems to be solved definitely by Seniczak (1977): the larvae and nymphs of *Anachipteria* show the typically folded notogaster and other characters of *Achipteria* juveniles, contrasting the juveniles of *Oribatella. Anachipteria* is a member of Achipteriidae.

In two very short descriptions, without figures, in the same paper Berlese (1908) established *Sphaerozetes howardi* and *Sphaerozetes latitectus,* both originating from Columbia, North America. The differences should be in the sensillus shapes. Later on Berlese changed the lable of a "*latitectus*" slide by adding "*howardi*" with pencil. It seems that Berlese regarded both species as synonymous, as indicated in his unpublished catalogue (see Norton & Kethley 1989). The reexamination of Berlese's slides led Norton & Kethley (1989) to the same assumption of synonymy of both species with the priority of *howardi,* described firstly (cf. Marshall et al. 1987; cf. Mahunka & Mahunka-Papp 1995). It belongs to *Anachipteria* in modern literature.

European records of both species, *A. howardi* and "*A. latitecta*", need to be reexamined. Grandjean (1932) discusses the species in connection with his description of *Anachipteria deficiens* Grandjean, 1932. Willmann (1931) describes and figures "*Tectoribates latitectus*" very cursorily, a specimen collected in north-western Germany, near Friesoythe. Seniczak (1977) figures the adult of "*A. latitecta*" together with juveniles, but it seems to be *A. deficiens,* more probably. The redescription of "*A. howardi*" from Hungaria by Mahunka (1996) is comparably good standard, but the sensillus shape is somewhat

smaller; it indicates the possibility that the species occurs in North America and in Europe, also. A reexamination of the Berlese slides by Norton & Kethley (1989; as by the author) resulted in the drawing fig. 3a of "*Sphaerozetes latitectus*" (Berlese's slide 73/16; conspecific with syntype slide 73/15 with the pencil mark "tipico = *Howardi*"). An originally designated type specimen of *S. howardi* has not been found. Supposed, that the sensillus shape has some variability, the redescriptions of Norton & Kethley (1989), fig. 3a, and Mahunka (1996) refer to the same species, *A. howardi*. *A. latitectus* (Berlese, 1908) is regarded as junior synonym.

Diagnosis of *Anachipteria howardi* (Berlese, 1908): Pteromorphs dorsally with a moderate sinus at the bothridia; Areae porosae of notogaster large, the largest is *Aa*; anterior notogastal setae c_2 moderately large (about 30 μm), posterior setae small; cuspis of lamellae somewhat truncated with a nearly transverse frontal border, at the outer side of the cuspis a small but distinct tooth; sensillus fusiform, mostly asymmetrical, with distinct tip, granulated; body length about 385-440 μm.

Anachipteria dubia, spec. nov.

Fig. 3b,c

This species exists up to now as two specimens, only. The type specimen is mounted in a microscopical slide in the Willmann collection in the Zoologische Staatssammlung in Munich and is labled as "*Tectoribates latitectus*". It is the specimen which has been illustrated by Willmann (1931: p. 181). Willmann indicates it as the single german species of the genus *Tectoribates*; he refers that the lamellae look like that of "*Notaspis*" (now *Achipteria* and related). Because of sacculi on the notogaster the species is different from *Anachipteria howardi*, which is the senior synonym of *Sphaerozetes latitectus* Berlese, 1908, as discussed in the last section.

The type locality after Willmann (1931) and the slide lable is: Moss of a bog; Rolfsort, Wolfstange bei Friesoythe (Oldenburg); type specimen in M134 – 13.8.27; the locality is in north-western Lower Saxonia, Germany (a second slide is M135). The slides are deposited in Zoologische Staatssammlung in Munich.

The mounted status of the species does not allow differentiated description, especially of the ventral morphology and the lateral aspect.

Diagnosis: Pteromorphs dorsally with a moderate sinus at the bothridia, without a knifelike anterior projection at the pteromorph; notogaster with 4 pairs of sacculi instead of areae porosae; anterior notogastal setae c_2 moderately large (about 30 μm), posterior setae small; cuspis of lamellae at the frontal border obliquely cut, with the corner at the outer side of the cuspis, as typical for most species of the genus; sensillus very small fusiform with distinct tip; body length about 470 μm. As far as visible the ventral morphology shows no specific characters. Legs with 3 claws.

Discussion: *A. dubia*, spec. nov. is the first species within *Anachipteria* with sacculi instead of areae porosae on the notogaster. The special form of the pteromorphs and all other characters, as far as visible in the slide, fit into the genus. But, the sacculi seem to me an insufficient argument to split off a new genus. The very similar achipteriid genera *Achipteria* and *Parachipteria* differ only by notogastral sacculi in the first and notogastral areae porosae in the latter genus, a poor argument for separating genera. For instance, I know a *Peloptulus* species with sacculi on the notogaster (the common species have areae porosae). As known by oribatologists, both homologous structures (see Norton et al. 1997) occur in many poronotic families, from case to case. It has no or minor worth for phylogenetic argumentation, but it seems to me being a typological character, only. The species name *A. dubia* spec. nov. refers to the doubtful systematic position within *Anachipteria*, regarding the genus definition, up to now.

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SPIXIANA	24	3	241–244	München, 01. November 2001	ISSN 0341-8391

Oenospila kopperi, spec. nov., eine neue grüne Geometride aus Sumatra

(Insecta, Lepidoptera, Geometridae, Geometrinae)

Axel Hausmann & Manfred Sommerer

Hausmann, A. & M. Sommerer (2001): *Oenospila kopperi*, spec. nov., eine neue grüne Geometride aus Sumatra (Insecta, Lepidoptera, Geometridae, Geometrinae). – Spixiana **24/3:** 241-244

Diagnostic differences in the male genitalia distinguish the new Sumatran species *O. kopperi* from the externally similar congeners in the Himalayas *(O. strix)* and in Sundaland *(O. altistrix, O. gemmans, O. microstrix)*. The new species was found in montane forest habitats. The larva and the host-plants remain unknown. Holotype ♂ in ZSM.

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Material

Oenospila kopperi, spec. nov.
Figs

Typen. Holotypus ♂, SUMATRA sept., Dairi mts. 30 km E Sidikalang, 1600 m, 20.II.1999, leg. U. Buchsbaum. – Paratypen: (9) in ZSM: SUMATRA sept., 1♂, Deli, Dolok Merangir, 150 m, 8.VI.1967, leg. Dr. E. Diehl; 1♂, id., 180 m, IX.1970-I.1971; 1♀, Simalungun, HW 2a, 28 km SW P.Siantar, 98°59'E, 2°46'N, 1050 m, 27.II.1992, leg. Dr. E. Diehl; 1♂, 5♀♀, Dairi mts. 30 km E Sidikalang, 1600 m, 20.II.1999, leg. U. Buchsbaum; (28) in coll. Sommerer (alle leg. Dr. E. Diehl soweit keine andere Angabe): SUMATRA sept., 1♀, Dairi mts. 30 km E Sidikalang 1600 m, 31.III.1984; 1♀, id., 1800 m, 27.IV.1986; 1♀, Tele W Tobasee 1600 m, 9.IX.1975; 3♂♂, id., 10.III.1984 (leg. Kobes); 1♂, id., 12.VII.1992 (Gen.Praep.MS 1996-72); 2♂♂, Sitahoan E Prapat 1450 m, 26.VI.1990; "Holzweg 3", 1150 m; 1♀, id., 18.II.1982 (Gen.Praep.MS 1999-172); 1♂, id., 25.I.-6.II.1982; 1♂, id., 30.X.1982 (Gen.Praep.MS 1996-70); 1♀, id., 14.XI.1982; 1♂, id., 28.-30.XI.1982 (Gen.Praep.MS 1996-71); 1♀, id. 12.IV.1983; 2♂♂,1♀, id., 15.-28.V.1983; 1♀, id., 15.VII.1983; 1♀, id., 2.-10.XII.1983; 3♀♀, id., 25.-31.I.1984; 1♂, id., 4.XI.1990 (Gen.Praep.MS 1999-11); 2♀♀, id., 21.III.1993; 1♀, id., 3.V.1997; 1♀, "Sipirok III" 16 km NE Sipirok 1300 m, 25.XII.1995; 1♂, (Tapanuli sel.), "Sipirok 3", 10 km NE Sipirok 1300 m, 29.I.1995.

Das Typenmaterial wurde dankenswerterweise von Mitgliedern der Heterocera Sumatrana Society e. V. (Göttingen), die zur ZSM eine enge Kooperation unterhält, für die wissenschaftliche Bearbeitung zur Verfügung gestellt. Die faunistische Erforschung Sumatras im Kontext der Faunen des Sundalands entspricht den satzungsmäßigen Zielen dieses Vereins.

Beschreibung

Habitus und äußere Morphologie (Abb. 1). Flügelspannweite 26-29 mm. Flügelfärbung hellgrün, Vorderflügelcosta weiß. Postmedianlinie braun, deutlich, stark gezackt. Mittelpunkt schwärzlich. An der Vorderflügelcosta auf der Höhe des Mittelpunktes ein weiterer schwärzlicher Punkt. Hinterflügel-



Abb. 1. *Oenospila kopperi*, spec. nov., Paratypus, ♂, Sumatra sept., "Sipirok 3", 10 km NE Sipirok 1300 m, 29.I.1995 (R. Kühbandner pinxit).

Analrand mit schwarzem Dreiecksfleck in der Mitte. Aderenden an der Fransenbasis durch deutliche schwarzbraune Punkte markiert. Stirn grün. Palpen ♂ 1,2facher, ♀ 2,5facher Augendurchmesser, letztes Palpenglied beim ♀ glatt beschuppt, länger als der Augendurchmesser. Fühler beim ♂ auf ½ der Gesamtlänge doppelt gekämmt, längste Fühlerkammzähne 6-8fache Geißelbreite. ♂ Hintertibia etwas verbreitert, Terminalsporen fehlend, Proximalsporen von extrem ungleicher Länge. Hinterbein mit etwas verkürztem Tarsus, Tarsus : Tibia = 2,5 : 3,5 mm.

♂ Genitalapparat (Abb. 2). Valvencosta stark sklerotisiert und zentral mit einem spitzen Fortsatz bewehrt. Sacculus-Anhänge schwach sklerotisiert, distal mit einem gebogenen, fingerförmigen Fortsatz. Aedoeagus terminolateral stark sklerotisiert und mit winzigen Dornen besetzt.

♀ Genitalapparat (Abb. 3). Gut mit der generischen Diagnose in Holloway (1996: 249; fig. 266) übereinstimmend. Im Vergleich mit der Typusart, *O. flavifusata* (Walker, 1861), mit auffälliger sklerotisierter Verbreiterung zwischen Ductus Bursae und Corpus Bursae. Signum-Ring groß.

Diagnose. Die neue Art gehört zu den südostasiatischen Geometrini im Genus *Oenospila*, das indoaustralisch verbreitet ist. Habituell zeichnet sie sich durch einen dunklen Dreiecksfleck im Hinterflügel aus, wo die Postmediane auf den Analrand trifft. Da sie dieses Merkmal mit weiteren Arten wie den gleich großen *O. strix* (Butler, 1889), *O. gemmans* Prout, 1935 und *O. altistrix* Holloway, 1996 sowie der kleineren *O. microstrix* Holloway, 1996 teilt, ist eine sichere Unterscheidung nur an Hand der Genitalmorphologie des ♂ möglich: Valvencosta bei *O. strix* und *O. altistrix* ohne spitzen Fortsatz bzw. ein solcher nur als kurzer Zahn entwickelt. Sacculus-Anhänge bei *O. strix* breit und kurz, bei *altistrix* zungenförmig ausgeprägt und stark sklerotisiert, bei *O. gemmans* zungenförmig, schwach sklerotisiert, mehr ventral anliegend und schräg stehend (Holloway 1996: 251).

Abb. 2. *Oenospila kopperi*, spec. nov., Paratypus, ♂ Genitalapparat (photo R. Trusch).

Abb. 3. *Oenospila kopperi*, spec. nov., Paratypus, ♀ Genitalapparat (photo R. Trusch).

Drei vorliegende Falter (1♂, 2♀♀) aus West-Malaysia aus der Sammlung Herbulot (ZSM) äußerlich strukturell und genitaliter der neuen Art nahestehend mit etwas längeren Palpen, jedoch ist weiteres ♂-Material nötig, um die taxonomische Stellung dieser Populationen zu klären.

Biologie. Die ersten Stände und die Futterpflanzen der Raupe sind nicht bekannt. Hinweise zur Biologie von *O. flavifusata* (Walker, 1861), der Typusart der Gattung *Oenospila,* die auch in Sumatra vorkommt, finden sich bei Holloway (1996: 250).

Verbreitung. *O. kopperi* ist bisher nur von Sumatra bekannt und wurde dort in Urwaldbiotopen zwischen 1100 m und 1800 m gefunden. Sie könnte eine Schwesterart der aus vergleichbaren Bergwäldern Borneos beschriebenen und bisher nur von dort bekannten *O. altistrix* darstellen.

Diskussion. Biogeographisch sind die – leider dramatisch schwindenden – Urwaldbiotope der Sundainseln von höchstem Interesse. Sie liegen einerseits im Schnittpunkt großräumiger Entwicklungslinien der biologischen Diversität, die vom australasischen, vom südchinesischen und vom himalayanisch-indischen Raum ausgehen. Andererseits zeigen wesentliche Komponenten unserer paläarktischen Fauna noch Verwandtschaft zu südostasiatischen Elementen, was mit den erdgeschichtlichen Ereignissen seit dem Tertiär zusammenhängen dürfte. Für das Verständnis der Prozesse der Artbildung und der biologischen Diversität in der nördlichen Hemisphäre spielt daher die Erforschung der südostasiatischen Faunen eine wichtige Rolle.

Die Gemeinsamkeiten und die Verschiedenheiten in den Faunen der einzelnen großen Sundainseln und des angrenzenden Festlands ergeben ein komplexes Bild, das – im Wettlauf mit der rasanten Naturzerstörung – dringend der weiteren Ergänzung in wissenschaftlicher Zusammenarbeit mit den Institutionen vor Ort (wie dem Museum Zoologicum Bogoriense, Java) bedarf. Die neue Geometriden-Art *Oenospila kopperi* mit ihren nächsten "Verwandten" im Himalaya *(O. strix),* auf Borneo *(O. altistrix* und *O. microstrix),* in Sumatra *(O. microstrix)* und in Java und Bali *(O. gemmans)* ist ein schönes Beispiel für die subtilen Ausprägungen der faunistischen Diversität in Südostasien. Auf die Anmerkungen von Holloway (1996) zu den einzelnen Arten wird verwiesen.

Derivatio nominis. Die neue Art wird nach Hilmar Kopper (Vorsitzender des Aufsichtsrats der Deutschen Bank AG) benannt.

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SPIXIANA	**24**	3	245–247	München, 01. November 2001	ISSN 0341-8391

A new *Oocorys* from Western Australia

(Mollusca, Gastropoda, Cassidae)

Kurt Kreipl & Axel Alf

Kreipl, K. & A. Alf (2001): A new *Oocorys* from Western Australia (Mollusca, Gastropoda, Cassidae). – Spixiana **24/3:** 245-247

A new species of the family Cassidae Swainson, 1832 is described from deep water off Western Australia. The new species belongs to the genus *Oocorys* Fischer, 1883 in the subfamily Oocorythinae Fischer, 1883. Type species of the genus is *Oocorys sulcata* Fischer, 1883. The Oocorythinae live in deep to very deep water (120 m to more than 4500 m).

The new species is compared with the similar looking *Oocorys lussii* Bozzetti, 1990 from the Western Indian Ocean now is regarded as a form of *Oocorys verrilli* (Dall, 1889) (Alan Beu, pers. comm.).

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Introduction

In December 2000 the senior author received three specimens of an unidentified *Oocorys* from the Australian shell dealer and collector Hugh Morrison. After a close examination of the shells and an intensive discussion with Dr Alan Beu, Lower Hutt, New Zealand we decided to describe this species as new to science.

Oocorys morrisoni, spec. nov.

Figs 1, 2

Types. Holotype: 160 naut. miles off Broome, Western Australia, on sand and mud in 450-500 m; collected by scampi trawlers. Size: height: 39.7 mm; width: 28.5 mm; adult, with operculum. Western Australian Museum, Perth, Western Australia, coll. no. WAM S 1365.

Paratypes: 1, in coll. Hugh Morrison, Kingsley, Western Australia. Size: height: 32.2 mm; width: 22.0 mm; adult, with operculum. – 2, in coll. Kurt Kreipl, Meeresmuseum Öhringen, Germany coll. no. 8400. Size: height: 32.5 mm; width: 20.9 mm; slightly subadult, with operculum.

Description of holotype

Shell ovate, small for the genus; thin-shelled but solid. Protoconch of 3 whorls, teleoconch of 2¾ whorls. Teleoconch whorls sculptured with strong, regularly-spaced spiral ridges (22 on the body whorl) crossed by numerous fine growth lines forming strong beads at points of intersection. Suture not incised. Very distinctive sutural ramp on the shoulder area. Outer lip thickened and reflected, bearing 15 rather low but distinct teeth along its inner edge. Parietal shield very weakly developed with spiral sculpture showing through. Columellar margin with 4 distinct teeth in the upper part of the aperture.

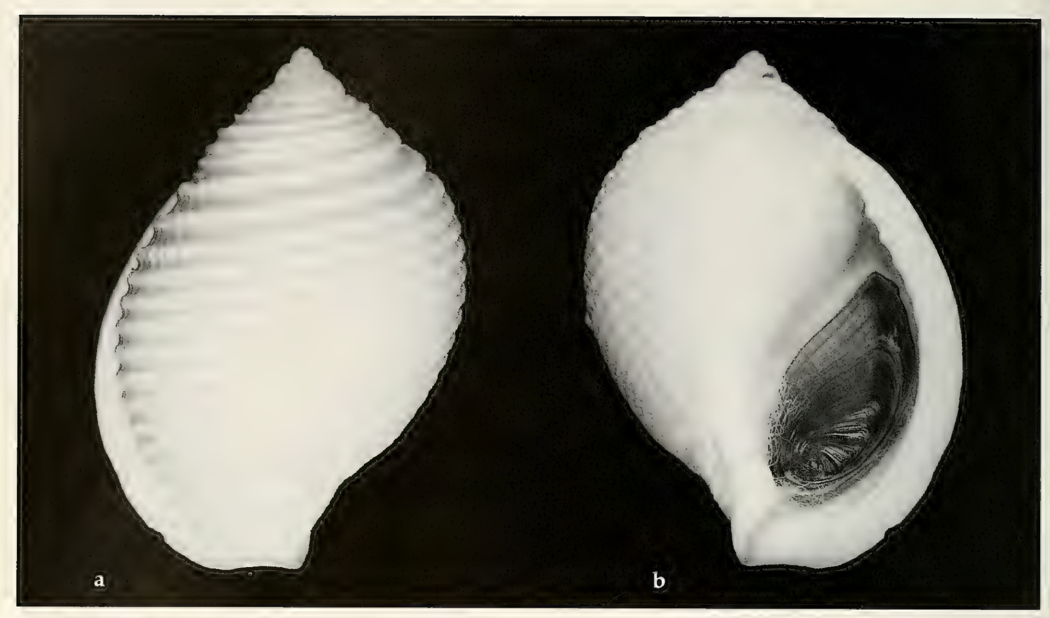


Fig. 1. *Oocorys morrisoni,* spec. nov. Holotype. **a.** Dorsal view. **b.** Ventral view.

Fig. 2. *Oocorys morrisoni,* spec. nov. Holotype and paratypes. **a.** Dorsal view. **b.** Ventral view.

Colour bright cream to soft orange with a moderate gloss. Outer lip and lower part of the columella white.

Operculum corneous, paucispiral; yellowish-brown.

Discussion: *Oocorys morrisoni*, spec. nov. at first glance very much resembles *Oocorys verrilli* form *lussii* (Bozzetti, 1990) from the western Indian Ocean (South Africa to Madagascar and Réunion), but differs in having more spiral cords on the body whorl (22 in *morrisoni;* 18-20 in *verrilli* form *lussii*) and more teeth on the inner edge of the outer lip (15 in *morrisoni;* 12 in *verrilli* form *lussii*). *Oocorys verrilli* form *lussii* does not have the distinct sutural ramp of *morrisoni*. The basic colour of *verrilli* form *lussii* is pale beige whereas *morrisoni* shows a bright cream to soft orange colour. The very distinct sutural ramp and particularly the coloration of *Oocorys morrisoni*, spec. nov. are the most distinguishing features of this new species as most other *Oocorys* are plain white, or at most pale cream or pale beige.

Etymology. We name this new species after the Western Australian shell dealer and collector Hugh Morrison who brought it to our attention.

Acknowledgements

For very useful information we want to thank Dr. Alan Beu, Institute of Geological and Nuclear Sciences, Lower Hutt, New Zealand. All photographs by Uschi Damaschke, Möckmühl, Germany.

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34. Reid, F. A.: A field guide to the mammals of Central America and Southeast Mexico. – Oxford University Press New York, 1997. 334 S., 48 Farbtaf., zahlreiche Verbreitungskarten. ISBN 0-19-506401-1.

Das Buch beschreibt Merkmale, Lebensweise, Verbreitung und Bestandssituation der Säugetiere Mittelamerikas. Der Geltungsbereich erstreckt sich vom Isthmus von Tehuantepec durch Mittelamerika bis Panama und deckt damit ein Gebiet ab, das viele naturkundlich interessierte Touristen anlockt. Durch das Zusammentreffen nordamerikanischer und neotropischer Faunenelemente findet sich in dieser Region eine besonders arten- und formenreiche Säugetierfauna. Es ist eine bewundernswerte Leistung der Autorin, alle Arten dieses Gebietes – immerhin mehrere 100 – in einem Buch zu vereinen, wobei alle Gruppen mit der gleichen Sorgfalt und wissenschaftlichen Seriosität abgehandelt werden. Sogar Wale und Seekühe sind eingeschlossen. Doch nicht nur die Zoologin, sondern auch die Illustratorin Fiona A. Reid verdient Anerkennung: Mit ganz wenigen Ausnahmen werden alle Arten in farbigen Zeichnungen abgebildet. Diese Abbildungen sind nicht nur ansprechend, sondern auch sehr informativ und wirklichkeitsnah und zeigen, daß sie nicht nach Museumsbälgen, sondern im Freiland "nach dem Leben" gezeichnet wurden. Auch die Merkmalsbeschreibungen im Text sind sehr detailliert und differenziert und zeugen von dem zeichnerisch geschultem Auge der Autorin. Alle taxonomischen und biologischen Angaben sind gut belegt und entsprechen dem aktuellen Kenntnisstand. Das Buch ist eine bemerkenswerte Neuerscheinung und ergänzt bisherige Werke, die Nord- oder Südamerika getrennt behandelt.

R. Kraft

35. Sartori, M. & P. Landolt: Fauna Helvetica 3: Atlas de Distribution des Ephémères de Suisse (Insecta, Ephemeroptera). – Schweizerische Entomologische Gesellschaft Neuchatel, 1999, 214 S. ISBN 2-88414-014-X.

In der bekannten Reihe ist nach dem Bestimmungsbuch der schweizerischen Eintagsfliegen von 1992 nun auch ein Verbreitungsatlas erschienen, der im allgemeinen Teil zweisprachig (Französisch, Deutsch), und im speziellen Teil, der die einzelnen Arten vorstellt, in französischer Sprache ausgeführt ist. Dieser Teil dokumentiert die Höhenverbreitung, die Flugzeit, die Typologie, d.h. die von den Larven besiedelten Lebensräume, den Lebenszyklus, die Ökologie, die Verbreitung und den Status, d.h. die zeitliche und räumliche Entwicklung der jeweiligen Art in der Schweiz, und enthält eine Verbreitungskarte der 85 nachgewiesenen Arten. Der vorangestellte allgemeine Teil beschreibt kurz die Biologie, die Bedeutung dieser Insektengruppe, die Geographie und Hydrologie der Schweiz mit Karten und Tabellen ebenso wie die die Besiedlung beeinflussenden physischen Faktoren, die Biogeographie, die nomenklatorischen Änderungen seit 1992, die Anzahl der zugrundeliegenden Datensätze und die Entwicklung der Artenzahl. Es folgt eine allgemeine Information zur Handhabung der Artenvorstellung und der verwendeten Kürzel. Den Schluß bildet eine Diskussion, die Angaben zur Faunistik und Ökologie unter Einbeziehung des Einzugsgebietes, der Höhenverbreitung, der Phänologie, der Entwicklungszyklen, wiederum der Typologie und dem Status der Arten enthält. Daran schließt sich noch ein Kapitel über die Besonderheiten der Eintagsfliegenfauna und deren Gefährdung an. Sieht man von einigen Ungenauigkeiten der deutschen Übersetzung ab, so ist dieser Band der Fauna der Schweiz ein wesentliches Werkzeug, die Verbreitung und Ökologie dieser Insektengruppe zu erfassen. E.-G. Burmeister

36. Jacquemin, G. & Boudot, J.-P.: Les Libellules (Odonates) du Maroc. – Societé Francaise d'Odonatologie, Bois D'Arcy, France,1999, 150 S. ISBN 2-9507291-3-4.

Nach den Erfassungen der Libellenfauna Morokkos von Lieftinck (1966) und Dumont (1972) ist eine Reihe neuer Arten, aber besonders auch Fundlokalitäten hinzugekommen, die in dem vorliegenden broschierten Heft dokumentiert sind. Dieses enthält neben Kurzfassungen zur Biologie und Ökologie der Arten eine Bestimmungstabelle der Imagines, eine Darstellungsfolge der Flügeladerung und Zeichnung der bisher nachgewiesenen 58 Arten sowie eine Liste der Fundorte mit deren graphischer Umsetzung. Die Artenliste ist ausgedehnt auf die Region des Maghreb (Marokko, Algerien, Tunesien). Die folgende artspezifische Dokumentation enthält Angaben der Fundlokalitäten, der Zoogeographie im allgemeinen und speziell bezogen auf Marokko, wobei die populationsspezifischen Charaktere im Vergleich hervorgehoben werden. Dem folgen Angaben zu Flugzeiten und eine Verbreitungskarte in Marokko. Einer Zuordnung der Arten zu den biogeographischen Regionen folgt wiederum ein Vergleich mit dem Arteninventar der Maghreb-Staaten sowie eine erste Rote Liste der Libellen Morokkos mit Erläuterungen. Die umfangreiche Bibliographie erweist sich als unentbehrliches Hilfsmittel, um Einzelinformationen zu den Funden zu erhalten. Den Abschluß dieser neuen gelungenen Zusammenfassung zur Libellenfauna dieses nordafrikanischen Landes bilden Fotos von Fundlokalitäten und Freilandaufnahmen der 58 Libellenarten. E.-G. Burmeister

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A new species of *Paroedura* Günther from northern Madagascar

(Reptilia, Squamata, Gekkonidae)

Frank Glaw, Miguel Vences & Kathrin Schmidt

Glaw, F., M. Vences & K. Schmidt (2001): A new species of *Paroedura* Günther from northern Madagascar (Reptilia, Squamata, Gekkonidae). – Spixiana **24/3:** 249-256

Paroedura lohatsara, spec. nov. is described from Montagne des Français, a deciduous dry forest on a karstic underground in the far north of Madagascar. The new gecko species is relatively large (up to 80.6 mm snout-vent length and 156.1 mm total length) and has blackish markings on the head which can form a vermiculated pattern. It is further characterized by having the nostril excluded from contact with the rostral scale, distinctly enlarged and spinous tubercles on the dorsal surface, and specific colouration of juveniles and adults. The relationships of the new species are obscure: Based on the nostril position, *P. lohatsara* belongs to the phenetic *Paroedura picta* species group which was hitherto considered as largely restricted to southern Madagascar. Other morphological and chromatic characters indicate a closer relationship of *P. lohatsara* with the syntopic *P. stumpffi* which is a member of the *P. sanctijohannis* species group. Two further species of *Paroedura, P. stumpffi* and *P. karstophila*, are recorded from Montagne des Français for the first time.

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Introduction

The genus *Paroedura* Günther, 1879 comprises nocturnal geckos which are endemic to Madagascar and the Comoro islands (Guibé 1956, Dixon & Kroll 1974), although fossil remains are also known from the Aldabra Atoll (Arnold 1976). The genus was recently reviewed by Nussbaum & Raxworthy (2000). According to these authors, *Paroedura* currently contains 14 species and can be divided into two phenetic species groups. The *sanctijohannis* group is defined by having the nostril in contact with the rostral scale whereas the *picta* group is defined by having the nostril excluded from contact with the rostral scale. The *picta* group was hitherto considered as restricted to the dry southern and western Madagascar, whereas species of the *sanctijohannis* group generally occur in less dry regions.

In this paper we describe a new species of *Paroedura* from northern Madagascar which belongs to the *picta* group according to the nostril position, but also shares similarities with a species of the *P. sanctijohannis* group.

Material and methods

Specimens were anesthetized by injection with chlorobutanol, fixed with 96 % ethanol and stored in 70 % ethanol. To make comparisons easier, the terminology and abbreviations of characters largely follow Nussbaum & Raxworthy (2000). Abbreviations used: UADBA = Université d'Antananarivo, Département de Biologie Animale; ZFMK = Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn; ZSM = Zoologische Staatssammlung, München. SVL = snout-vent length; TL = tail length; HL = head length; HW = head width, at widest point; SL = snout length, anterior edge of eye to tip of snout; ED = horizontal eye diameter; EO = ear opening diameter; AGL = axilla-groin length; Forelimb = forelimb length, from axilla to tip of longest finger; Hindlimb = hindlimb length, from groin to tip of longest toe; Supralab = number of supralabial scales; Infralab = number of infralabial scales; Sdlm = number of subdigital lamellae on digits I-V of manus; Sdlp = number of subdigital lamellae on digits I-V of pes. Counts are listed left-right. All measurements were done with a caliper to the nearest 0.1 mm by the same person (FG). Material of 11 of the 14 *Paroedura* species (all except *P. maingoka, P. vahiny* and *P. homalorhina*) from the ZSM and ZFMK collections was available for comparison.

Paroedura lohatsara, spec. nov.
Figs 1-3

Types. Holotype: ZSM 985/2001, adult male, collected 14-21 March 2000 at Montagne des Français (between 12°19'17"S, 49°20'13"E, 174 m altitude and 12°19'34"S, 49°20'09"E, 334 m altitude), northern Madagascar, by F. Glaw, K. Schmidt & M. Vences. Captured as adult and kept for more than one year in captivity before preserved. – **Paratypes:** ZSM 529/2000 (adult male), ZSM 807/2001 (adult female, captured as adult and kept for about one year in captivity before preserved), ZSM 530/2000 (juvenile), and three further uncatalogued adult specimens (one male and two females which are still kept alive in the vivarium), all collected 14-21 March 2000 at the same locality by the same collectors as the holotype. ZSM 986/2001, just hatched juvenile, and ZSM 987/2001, 7-14 days old juvenile, both captive bred, being offspring of the holotype and of one of the two uncatalogued female paratypes.

Diagnosis. *Paroedura lohatsara*, spec. nov. is a relatively large-sized species (maximum SVL 80.6 mm, maximum total length 156.1 mm) with prominent dorsal tubercles which are arranged into distinct longitudinal rows. It differs from the species of the *sanctijohannis* group *(P. gracilis, P. homalorhina, P. karstophila, P. oviceps, P. masobe, P. sanctijohannis, P. stumpffi, P. tanjaka* and *P. vazimba)* in having the nostril excluded from contact with the rostral scale by interposition of a large prenasal scale. *P. lohatsara* shares the nostril position with the species of the *picta* group (*P. maingoka, P. bastardi, P. picta, P. vahiny* and *P. androyensis*), but differs from *P. androyensis* and *P. vahiny* in much larger size (80.6 compared to 47 mm maximum SVL); from *P. maingoka* and *P. picta* by distincly larger dorsal tubercles which are arranged into obvious longitudinal rows. It differs from *P. bastardi* (including the recently described subspecies *P. b. ibityensis,* see Rösler & Krüger 1998) by mainly tetrahedral dorsal tubercles (mainly trihedral in *P. bastardi*), a relatively longer and thinner tail, and the shape of the postmental scales (distinctly longer than wide in *P. lohatsara* versus regular hexagonal in *P. bastardi*). Furthermore, *P. lohatsara* differs from all other *Paroedura* species by its distinct adult colouration and from *P. bastardi, P. maingoka, P. picta,* and *P. stumpffi* by juvenile colouration (the juvenile colourations of the other species are still undescribed).

Description of the holotype
Measurements and counts in tab. 1. Well preserved, with complete original tail. Hemipenis extruded, head wider than neck, about as wide as body. Snout angled downward to tip, slight depression between prominent canthal ridges. Ear opening is a vertical slit. Tail longer than snout-vent length, nearly round in cross section, with sharply pointed tip; ventral pygal section with pair of postcloacal sacs. Digits moderately expanded at tips. Rostral scale rectangular, wider than tall, as wide as mental. Nostril in contact with large prenasal anteriorly, and four further scales, but not with first supralabial. First supralabial largest, labials smooth. Snout and interorbital scales juxtaposed, some raised, scales in front of orbits tuberculate, as are larger lateral occipital scales. Dorsolateral neck and body scales very heterogeneous with about 12 distinct longitudinal rows at midbody of enlarged, spiny, mainly tetrahedral tubercles; enlarged tubercles separated mostly by small flat scales and smaller tubercles. Dorsal scales of forelimbs flat or tuberculate and weakly imbricate. Dorsal scales of hindlimbs large and

Fig. 1. *Paroedura lohatsara*, spec. nov. Male holotype (ZSM 985/2001).

Fig. 2. *Paroedura lohatsara*, spec. nov. Female paratype (uncatalogued).

strongly tuberculate, much smaller above kneejoint. Ventral scales of forelimbs and hindlimbs slightly smaller than surrounding ventral scales of the body. Dorsal pygal scales like dorsal body scales; lateroventral pygals tuberculate but less spinous. First 19 postpygal tail segments each with transverse row of spiny tubercles dorsolaterally; first four rows with 10-12 tubercles, gradually decreasing to the last rows with about four tubercles; posterior tail with flat scales. Mental triangular, bordered posteriorly by a pair of elongate, irregular hexagonal postmentals. Postmentals contact mental, first infralabial, one enlarged lateral gular, one smaller posterolateral gular, and one slighty larger central gular. First three infralabials significantly larger than others. Gulars small, granular. Ventrals of chest and abdomen flat, posterior abdominals largest. Proximal subdigitals in rows of 2-3, distally to narrow leaf-like rows of scales followed by enlarged row supporting terminal pads. Pair of squarish, terminal pads, each pad about 1 mm across. Claws curving downwards between terminal pads of digits.

Colour after one day in alcohol virtually identical to that in life (Fig 1). Head dorsally beige with more or less symmetrical blackish markings. A black band from the second supralabial to anterior eye and from posterior eye to a point above the ear opening. A beige mid-dorsal stripe (of 2 mm diameter at midbody) runs from the neck to the pygal portion of tail. Neck and dorsum beige with blackish spots which are arranged into four irregular longitudinal rows; two rows border the mid-dorsal stripe, the other two rows run more dorsolaterally to the pygal portion of the tail. Additional black spots are present on the flanks. Many of the enlarged tubercles on the flanks are whitish. Dorsal surface of forelimbs and hindlimbs beige with dark brown markings. Postpygal tail dorsally with about nine whitish and nine black alternating transverse bands which are partly not well delimited in the proximal portion of the tail. Throat, chest, venter, pygal tail portion and ventral parts of forelimbs and hindlimbs whitish; ventral side of tail light brownish. Tongue dark grey at its distal tip. A yellow ring around the eye. Iris silvery-golden with small veins in life, not recognizable when preserved since pupil was much enlarged after preservation.

Tab. 1. Morphometric and meristic variation among the holotype and two adult paratypes of *Paroedura lohatsara*. Measurements in mm.

Collection number	ZSM 985/2001	ZSM 529/2000	ZSM 807/2001
Status	holotype	paratype	paratype
Sex	male	male	female
Maturity	mature	mature	mature
SVL	70.6	69.0	72.8
TL	75.8	45.8*	65.0
HL	25.1	24.0	25.6
HW	17.5	16.3	17.0
SL	9.7	9.3	9.6
ED	5.7	5.4	5.5
EO	2.7×0.5	2.2×0.5	3.1×0.8
AGL	30.4	30.1	33.0
Forelimb	23.7	25.0	25.9
Hindlimb	36.3	34.4	32.0
Supralab	12-11	10-10	13-12
Infralab	11-12	9-9	11-11
Sdlm I	8-8	10	9-9
Sdlm II	10-9	9	10-11
Sdlm III	11-10	12	11-11
Sdlm IV	12-12	11	11-11
Sdlm V	10-10	11	10-10
Sdlp I	8-9	8-9	9-9
Sdlp II	10-11	9-9	10-11
Sdlp III	12-13	12-13	11-12
Sdlp IV	14-14	13-13	13-13
Sdlp V	13-14	14-12	12-11

* tail regenerated

Variation. Morphometric and meristic variation of two paratypes (ZSM 529/2000 and ZSM 807/2001) are summarized in table 1. ZSM 529/2000 is an adult male with extruded hemipenes; the right forelimb was removed for future DNA studies. The regenerated tail has no spinous tubercles and is irregularly marbled with brown and white. The general colouration is similar to the holotype whereas that of the female ZSM 807/2001 is more contrasting: the largely symmetrical blackish markings on the head form a vermiculated pattern and the black spots on the dorsum are less clearly arranged into longitudinal rows. A distinct white band bordered by a thin blackish band on each side runs from the anterior dorsum to the anterior insertion of arm. The original and complete tail has 11 alternating dark and 10 light bands and is distinctly thinner than in the holotype. The whitish scales on the flanks are very prominent. The three living paratypes (all with original tail) largely agree with the preserved types. Their size (measured 12 July 2001 in life) was 73.9 mm SVL + 82.2 mm TL (male), 80.6 mm SVL + 72.5 mm TL (female, Fig. 2), and 79.7 mm SVL + 57.1 mm TL (female, last tail tip missing). TL is shorter than SVL in the three females, but longer than SVL in the two males with original tail. The SVL of the three adult males (69.0-73.9 mm SVL) is slightly shorter than in the three females (72.8-80.6 mm), but total length appears similar in both sexes. All type specimens and all further captive-bred specimens agree in having distinct dark markings on the head. The juvenile paratypes (ZSM 530/2000, 32.4 mm SVL + 31.3 mm TL; ZSM 986/2001, 32.0 mm SVL + 26.8 mm TL; ZSM 987/2001, 31.2 mm SVL + 29.8 mm TL) have a distinct juvenile colouration which was also typical for the other juveniles which we reared in captivity (Fig. 3): Four distinct whitish transverse bands on the dark brown back and flanks. Laterally, the most anterior band is distinctly narrower than the two following bands and ends pointed slightly anterior of the insertion of the forelimbs. The two bands between forelimbs and hindlimbs are not pointed laterally and have the same width on the entire flanks as on the back. The posteriormost band, positioned between the hindlimbs, is restricted to the back. There is no light mid-dorsal line. The upper surface of the tail is banded with beige and brown in the preserved specimens, but bright orange with dark crossbands in life. Dark symmetrical markings on the head are already well recognizable. The head is relatively broad and short, especially in comparison with similar sized juveniles of *P. stumpffi* and *P. bastardi*. About three months after hatching the juvenile colouration gradually converts into the adult colouration. Subadults still have more or less distinct transversal bands on the back whereas in older adults these bands are poorly or not recognizable. A light mid-dorsal stripe is present in subadults and adults.

Distribution and conservation. *Paroedura lohatsara* is only known from the Montagne des Français in the far north of Madagascar. Numerous animal and plant species appear to be endemic to this karstic massif, among them a still undescribed snake species of the genus *Heteroliodon* (pers. obs.). It is therefore likely that *Paroedura lohatsara* is a further endemic species of the Montagne des Français massif. In this case the new species may be considered as vulnerable due to its small range although its habitat is apparently not immediately threatened by destruction. Regarding the numerous endemics in Montagne des Français this area should be protected as nature reserve.

Habitat and habits. In nature, the new species was only observed at night in dry forest on a karstic underground, several days after heavy rains. The geckos were mainly climbing on rocks and branches up to two metres above the ground. In captivity, juveniles and adults were able to feed on relatively large insects. Nussbaum & Raxworthy (2000) described a prominent vertical or anteriorly curved tail display in disturbed *Paroedura maingoka* which they interpreted as defensive behaviour. A similar behaviour was sometimes observed by us in disturbed captive-bred subadult *P. lohatsara* and *P. stumpffi*, e.g. when the specimens were faced with torchlight at night. However, it was also observed in undisturbed *P. lohatsara* in the vivarium, indicating that it may also serve for intraspecific communication. A detailed analysis of this and other behavioural traits in *Paroedura picta* was provided by Brillet (1986, 1993).

Sympatric species. Two other species of *Paroedura* were found in sympatry with *P. lohatsara*. Both are hereby recorded for the first time at Montagne des Français: *P. karstophila* (ZSM 531/2000 and 532/2000) was found in close syntopy with *P. lohatsara* in the limestone massif whereas *Paroedura stumpffi* (ZSM 635/2000) was only encountered on the slope between the massif and the sea, outside the karstic underground.

Reproduction. One male and two females of *P. lohatsara*, captured as adults at Montagne des Français in March 2000, were kept and bred in a vivarium (1 m × 0.5 m × 0.8 m) together with a couple of *P. stumpffi* from the same locality. As usual in other *Paroedura* species (Schröder 1987, Rösler 1998), a clutch generally consisted of two single eggs which were neither glued to each other nor to the underground. The white eggs had a hard calcareous shell and were buried singly few millimetres into sandy ground. In comparison to *P. stumpffi*, eggs of *P. lohatsara* were generally deposited in drier places and were always distinctly larger. 15-20 days after egg deposition eggs measured 13.2 × 10.3 mm and 13.4 × 10.4 mm (n=2) in *P. lohatsara* and 10.8 × 8.2 mm to 11.6 × 8.6 mm (n=5) in *P. stumpffi* (a similar size difference was observed but not measured in numerous other cases). Eggs were incubated differently, either at a constant temperature of 27 °C or at 30 °C during the day and 23 °C at night. Juveniles hatched 70-82 days after the discovery of the eggs (at 27 °C) and after 85-87 days under the variable incubation temperatures, indicating that the total time between egg deposition and hatching was ca. 70-90 days. Hatchlings of *P. lohatsara* (total length 59-60 mm, n=2) were distinctly larger than those of *P. stumpffi* (total length 50-52 mm, n=3). All juveniles were identified either as *P. stumpffi* or *P. lohatsara*, indicating that hybridization did not occur in the vivarium.

Only little is known about reproduction of *P. lohatsara* in nature. The total length of a juvenile paratype (ZSM 530/2000), collected 21 March 2000, is only 4 mm longer than that of just hatched juveniles, indicating that it was only few weeks old when captured. Assuming an approximate egg incubation time of 70-90 days (as found in captivity) the corresponding egg was laid at the beginning of the rainy season as is typical in many Madagascan reptiles (Glaw & Vences 1996).

The first eggs laid by the F1 generation were found on 30 June 2001, ten months after hatching of the first juveniles (22 August 2000), indicating that sexual maturity in captivity was reached less than ten months after hatching. To document the adult size at first reproduction, the largest male and female of the F1-group were measured after the first eggs were found: The largest male measured 111 mm total length and the largest female 106 mm total length.

According to our experience, egg laying females of *P. lohatsara*, *P. tanjaka* and *P. bastardi* apparently have an enormous need of calcium and are vulnerable to rachitis. Despite of regular addition of several pulverized Calcium products to the food, the faeces sometimes contained a remarkable amount of sand which was apparently actively ingested to take in calcium. After much pulverized limestone was added to the vivarium the faeces contained less sand. The high need of calcium may explain why several *Paroedura* species like *P. karstophila*, *P. tanjaka*, and *P. lohatsara* seem to be restricted to limestone habitats. This restriction may be true for other oviparous Malagasy reptiles with hard-shelled eggs as well.

Etymology. *loha* (Malagasy) means head; *tsara* (Malagasy) means beautiful or good. The specific name *lohatsara* refers to the beautiful head colouration of the new species and is considered as invariable noun in apposition to the generic name.

Available names. Several available names in the genus *Paroedura* are considered as junior synonyms of valid species names, all of them belonging to species having the nostril separated from the rostral. These names need to be considered as possible earlier names for *P. lohatsara*. *Diplodactylus porogaster* Boulenger, 1896 (type locality: "south-western Madagascar") is considered as synonym of *Paroedura androyensis* (Angel 1942, Guibé 1956), and *Diplodactylus robustus* Boulenger, 1896 (type locality: "south-western Madagascar") as synonym of *P. picta* (Angel 1942, Guibé 1956). The type specimens of both taxa are deposited in the Natural History Museum at London and are not available at present. However, based on the chromatic and morphological characters given in the original descriptions (Boulenger 1896) it seems likely that these synonymies are correct. In addition, the type locality of both taxa is in south-western Madagascar whereas *P. lohatsara* is only known from a karstic massif at the northern tip of the island. The type locality ("Tulléar") of *Phyllodactylus madagascariensis* Mocquard, 1894 is in south-western Madagascar as well. This taxon is considered as synonym of *P. picta* (Angel 1942) which is common around Tulear according to our observations. It is based on a single poorly preserved specimen with a SVL of 40 mm (Mocquard 1895) and the characters given in the original description seem to fit to those of juvenile *P. picta*. *Paroedura guibeae* Dixon & Kroll, 1974 was shown to be a junior synonym of *P. bastardi* by Nussbaum & Raxworthy (2000). Summarizing, none of the synonyms is available as earlier name for *P. lohatsara*.

Relationships. As already noted above, the genus *Paroedura* can be divided into two phenetic species groups based on the position of the nostril (Nussbaum & Raxworthy 2000). The species of the



Fig. 3. Juveniles of *Paroedura bastardi* (left above), *P. lohatsara* (middle) and *P. stumpffi* (right below).

sanctijohannis group are widely distributed in different climatic regions in western *(P. tanjaka, P. vazimba)*, eastern *(P. gracilis, P. masobe)* and northern Madagascar *(P. homalorhina, P. oviceps, P. stumpffi, P. karstophila)*, and even on the Comoro Islands *(P. sanctijohannis)*. The species of the *picta* group are thought to be largely restricted to arid southwestern Madagascar *(P. maingoka, P. bastardi, P. picta, P. vahiny* and *P. androyensis)*. *P. lohatsara* does not support this distributional pattern: It clearly belongs to the *picta* group based on the position of nostrils, but is only known from extreme northern Madagascar. Although the range of *P. lohatsara* is widely separated from the other species of the *picta* group, this fact does not necessarily argue against the monophyly of this phenetic group since several animal and plant taxa of the Montagne des Français have affinities to those of dry western and southern Madagascar. Further research is therefore necessary to clarify whether the two phenetic species groups which are defined by a single morphological character (nostril position) represent natural clusters or not.

Another remarkable morphological character in *Paroedura* is the prominence of the dorsal tubercles. These are very distinct and arranged in obvious longitudinal rows in *P. bastardi, P. stumpffi,* and *P. lohatsara* but less prominent (and arranged in obvious longitudinal rows in only some taxa) in the other species *(gracilis, oviceps, karstophila, masobe, sanctijohannis, androyensis, picta, vazimba, vahiny, homalorhina, tanjaka, maingoka)*. The similarity of *P. stumpffi* and *P. bastardi* regarding this character was possibly the reason why Dixon & Kroll (1974) considered their *P. guibeae* (which was synonymized with *P. bastardi* by Nussbaum & Raxworthy 2000) as "mainland form" of *P. stumpffi*. Most of the prominent dorsal tubercles of *P. bastardi* can be described as trihedral whereas those of *P. stumpffi* and *P. lohatsara* are mainly tetrahedral. Further similarities between the latter two species in (1) the shape of the tail (relatively long and always thin in *P. lohatsara* and *P. stumpffi* versus relatively short and often rather thick in *P. bastardi*), (2) the shape of the postmental scales (distinctly longer than wide in *P. lohatsara* and *P. stumpffi* versus regular hexagonal in *P. bastardi*), (3) several characters of adult and juvenile colouration, and (4) geographic distribution (*P. stumpffi* and *P. lohatsara* in the north, *P. bastardi* in the west and south) may indicate that *P. lohatsara* is perhaps more closely related to *P. stumpffi* than to *P. bastardi*.

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Two new species of the genus *Oreophryne* from Irian Jaya, Indonesia

(Amphibia, Anura, Microhylidae)

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Günther, R., S. J. Richards & D. Iskandar (2001): Two new species of the genus *Oreophryne* from Irian Jaya, Indonesia (Amphibia, Anura, Microhylidae). – Spixiana **24/3:** 257-274

Two new species of *Oreophryne* from western Irian Jaya (Papua Barat = West Papua) are described. They are small (SVL of males < 24 mm) and distinguished from all congeners by having prominent, angular snouts and dark brown or black head sides and throats. Both taxa are scansorial, calling from leaves between about 0.5 m and 2.5 m above the ground in rainforest habitats. The advertisement calls of both species consist of long trains of distinctly pulsed notes, but calls differ from one another in several structural features including the number of pulses per note.

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Introduction

The most recent overviews of New Guinea amphibians recognise 14 species of the microhylid genus *Oreophryne* from mainland New Guinea and surrounding islands (Frost 1985, 1998-1999, Zweifel & Tyler 1982). Since those summaries only one additional species, the extremely small *O. minuta*, has been described from the region (Richards & Iskandar 2000). However recent surveys in Indonesian New Guinea (Irian Jaya) by S. Richards and D. Iskandar, and independently by R. Günther, have revealed a number of new *Oreophryne* species. Two of these, one from the Wondiwoi Mountains at the base of the Wandammen Peninsula, and the other from the Wapoga River basin, appear to be very closely related to one another but distinct from all previously described *Oreophryne*. Here we describe the new species and present brief observations on their advertisement calls and natural history.

Material and methods

Frogs were generally collected at night when they were easily detected by their distinctive advertisement calls. Several individuals of both new species were photographed in life and all specimens were anaesthetised with chlorobutanol and fixed in 2 % formalin (RG) or 70 % ethanol (SJR, DI). Tissue samples were extracted from some specimens and stored in 70 % ethanol before the animals were fixed in formalin, to allow later DNA studies. All specimens were preserved in 75% ethanol upon return to the laboratory.

Advertisement calls were recorded with a Sony Walkman TCD-D100 Digital Audio Tape (DAT) and Sennheiser microphone MKE 300 (RG) or a Sony WMD-6C Professional Walkman and ECM-Z 200 microphone (SJR). Calls were analyzed with Avisoft-SAS Lab software. Two paratypes of the new species from Wandammen Peninsula were cleared and stained using a method modified from Dingerkus & Uhler (1977). Snout-urostyle length (SUL), tibia length (TL), length of 4th toe (L4T) and length of 3rd toe (L3T) – from tip of the toes to proximal end of inner metatarsal tubercle, tarsus length (TaL), and distance between the supratympanic folds immediately behind eyes (FD), were measured with a vernier calliper; length of the first toe (L1T) from tip to distal end of inner metatarsal tubercle, length of the inner metatarsal tubercle (LMT), horizontal diameter of the disc of the 4th toe (T4D) and that of the 3rd finger (F3D), head length from tip of snout to posterior margin of tympanum (HL), head width taken in the ear region (HW), distance from anterior corner of orbital opening to center of naris (END), internarial distance between the centres of the nares (IND), distance from anterior to posterior corner of orbital opening (ED), and horizontal diameter of tympanum (TyD) were measured with an ocular micrometer in a binocular dissecting microscope.

Type specimens are deposited in the Museum für Naturkunde, Berlin (ZMB), the South Australian Museum, Adelaide (SAMA) and the Museum Zoologicum Bogoriense, Bogor (MZB).

Photographs in Figs 14 and 15 were taken by S. Richards, all others by R. Günther.

Oreophryne atrigularis, spec. nov.

Figs 1-13

Types. Holotype: ZMB 62226, adult male, collected by R. Günther on 30.VII.1998 at an altitude of 610 m a.s.l., Wondiwoi Mountains at the base of the Wandammen Peninsula, about 8 km west of the coastal village of Yeretuar, 2°56'S, 134°36'E, Nabire district, Irian Jaya, Indonesia. – **Paratypes:** 22 adult males with inventory numbers ZMB 62162, 62164-67, 62182, 62215, 62217-20, 62222-25, 62641-42 and 62644-45, MZB. Amph. 7361-62 and SAMA R55924; one adult and one subadult female (ZMB 62640 and 62163); and two juvenile specimens ZMB 62216 and 62646. Two adult males (ZMB 63291 and 63292), were cleared and double stained as skeletal preparations and are stored in glycerine. All paratypes were collected between 350-750 m a.s.l. on the eastern slopes of the Wondiwoi Mountains west of the coastal village of Yeretuar, ZMB 62214-26 between 28.VII.-1.VIII.1998, ZMB 62162-66, 62182 between 21.-29.VIII.1999 and ZMB 62167, 62640-46 between 7.-12.V.2000. Collectors were R. Günther, S. Marani, G. Mareku and I. Tetzlaff.

Diagnosis. *O. atrigularis* is assigned to the genus *Oreophryne* on the basis of the structure of its shoulder girdle: clavicles and procoracoids are present but reduced. The former are small ossified bones which are broadly separated and reach laterally only to the middle of the coracoids. The cartilaginous procoracoids nearly meet the anterior tip of the sternum, and extend laterally no further than the middle of the coracoids. A combination of the following characters separates the new species from all hitherto known congeners: (1) snout strongly protruding and canthus rostralis sharply edged, (2) throat and sides of head black, (3) no webbing between toes, (4) fifth toe shorter than third toe. Advertisement call a long series of notes, each between 171 and 262 milliseconds in length.

Description of the holotype

An adult male with the following measurements (in mm) and ratios: SUL 22.0, TL 11.7, L4T 9.9, L3T 7.2, FD 6.7, TaL 7.2, L1T 1.7, LMT 1.0, T4D 1.0, F3D 1.1, HL 6.8, HW 8.3, END 2.0, IND 2.1, ED 2.4, TyD 0.8; TL/SUL 0.53, HL/SUL 0.309, HW/SUL 0.377, END/SUL 0.091, ED/SUL 0.109, HL/HW 0.819 and F3D/SUL 0.050. Skin smooth, snout tapering and projecting, canthus rostralis sharply defined; no maxillary or vomerine teeth; two palatal ridges, anterior ridge very low and with indistinct lobes, posterior ridge with 14 small but distinct whitish denticles; tongue elongated, without indentation and free posteriorly; one rather long slit-like vocal sac opening on each side of the tongue, with a single internal subgular vocal sac. Loreal region straight and angled outwards; tympanum covered by skin and scarcely visible. Head broader than long; legs rather long and slender, all fingers and toes expanded distally into discs with circummarginal grooves, discs on fingers somewhat broader than those on toes, terminal disc of 3rd finger about twice as broad as penultimate phalanx, first finger and first toe conspicuously reduced. Fingers in order of decreasing length 3>4>2>1; toes 4>3>5>2>1. Subarticular tubercles and metatarsal tubercle poorly developed. Upper side of head, dorsum and limbs beige with some spots and marbling. A conspicuous whitish mid-dorsal line is bordered by concentrations of blackish pigments along its whole length. A similar line extends from heel to middle of posterior side of tibia. A w-shaped mark in the scapular region surrounds two whitish spots. A black

Fig. 1. Lateral view of a paratype (ZMB 62167) of *Oreophryne atrigularis*, spec. nov.

Fig. 2. Ventral view of a paratype of *Oreophryne atrigularis*, spec. nov.



Fig. 3. Ventral view of the right hand (left) and the right foot (right) of a paratype (ZMB 62644) of *Oreophryne atrigularis,* spec. nov.

band from upper arm to tip of snout contrasts sharply with the beige dorsal colouration but grades into the blackish throat ventrally. Anterior of belly speckled with dark brown, posterior of abdomen cream coloured without spots. Concealed parts of hind limbs unpigmented, yellowish in preservative but reddish in life.

Variation in the type series. Snout-urostyle length of 22 adult males ranged from 20.2 to 22.5 mm (mean 21.5 mm, SD 0.65). One female was adult at 26.3 mm, and another female appears to be subadult at 22 mm, with oocytes in the early stages of development. Two specimens of 15.8 and 18 mm SUL respectively show no signs of sexual maturity. Selected body proportions of the type series (except juveniles and cleared and stained specimens) are listed in table 1. Most specimens beige dorsally, but some with greyish-brown ground colour in life, retained in ethanol. Shape of pupil is oval in all specimens, but colour in life varied from yellowish or silvery to brown. Margin of eyelid was white in all specimens in life. Tympana in all specimens more or less covered by skin. Dorsum of some specimens with minute dark spots (visible under magnification), but others with larger spots and areas of mottling on dorsum and extremities. Thirteen out of 27 specimens have a thin whitish mid-dorsal line extending from snout to end of urostyle, and in most specimens a similar line extends from heel onto posterior side of tibia (Fig. 1). About 50 % of animals exhibit a w-shaped mark in scapular region that encompasses two whitish spots. Commonly a few small warts on dorsum and/or dorsal side of hind limbs. Concealed surfaces (while sitting) of hind limbs in nearly all specimens without dark pigment,

Tab. 1. Body proportions of the type series (n=23 males and 2 females) of *Oreophryne atrigularis;* SD=Standard deviation.

Ratio	Mean	SD	Range
TL/SUL	0.54	0.019	0.48-0.57
HL/SUL	0.30	0.010	0.28-0.32
HW/SUL	0.37	0.016	0.33-0.40
HL/HW	0.82	0.037	0.74-0.89
ED/SUL	0.110	0.005	0.098-0.120
END/SUL	0.095	0.003	0.087-0.103
F3D/SUL	0.053	0.004	0.043-0.060



Fig. 4. Cleared and double stained paratype (ZMB 63291, older specimen) of *Oreophryne atrigularis*, spec. nov. Dorsal view of the whole skeleton except distal parts of extremities.

cream coloured in fixative and reddish or red in life (Fig. 2). A black band from insertion of upper arm through lower part of tympanum to tip of snout, including eye and sides of snout, is conspicuous in all specimens. This black stripe contrasts sharply with beige colour of dorsum, but merges with blackish colour of the throat. Throat pale grey (not blackish) in only two specimens (ZMB 62640, female; ZMB 62641, male). Black colour of throat may extend to chest and anterior of belly, but generally grades posteriorly into dark brown or dark grey marbling. Some individuals with very small white spots on dark parts of venter, and some with an inconspicuous whitish cross on chest. Size and shape of toes and fingers as described for the holotype (Fig. 3). Ventral side of extremities more or less spotted. Skin smooth dorsally and ventrally in most specimens, but some with belly granular. Black coloration on throat and laterally on head is consistent among males, females and juveniles demonstrating that this coloration is not a secondary sexual character. However conspicuous black colour of head, evident in living specimens during the day and in preserved specimens as well, is more or less faded, and in some cases invisible, in specimens actively calling at night.

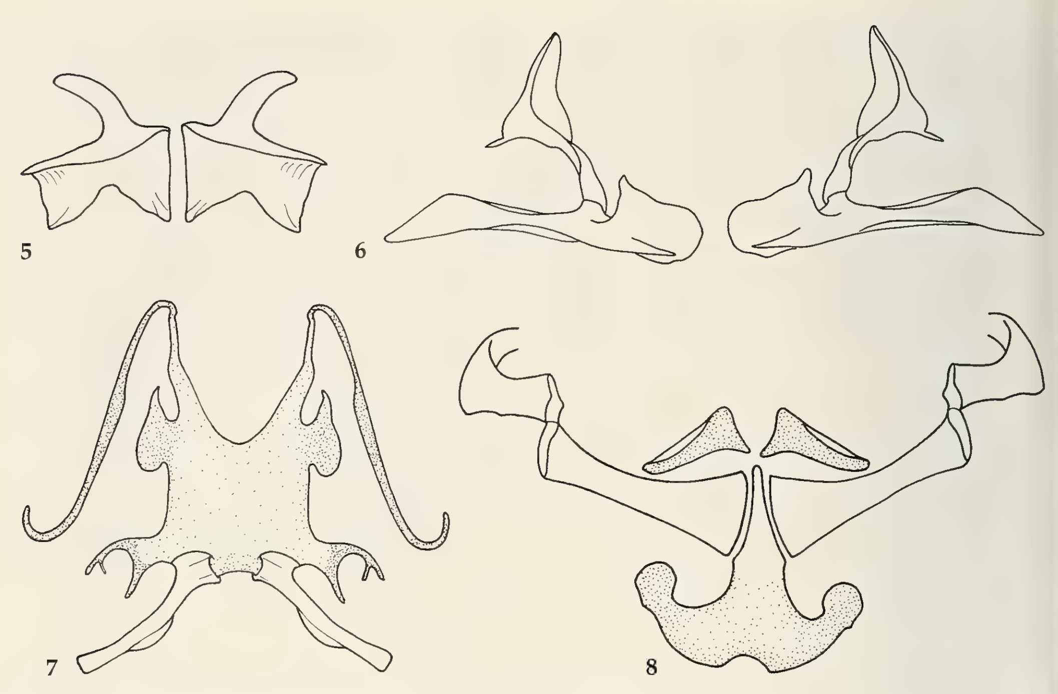


Fig. 5. Premaxillaries of *Oreophryne atrigularis*, spec. nov. (ZMB 63291).
Fig. 6. Prevomers of *Oreophryne atrigularis*, spec. nov. (ZMB 63291).
Fig. 7. Hyoid plate of *Oreophryne atrigularis*, spec. nov. Anterior process of processus posterolateralis is bifurcate in this older specimen (ZMB 63291) but has only a single process in the younger cleared specimen.
Fig. 8. Shoulder girdle of *Oreophryne atrigularis*, spec. nov. (ZMB 63291).
White: bones; stippled: cartilago.

Osteology (based on two cleared and double stained paratypes, ZMB 63291 and 63292): Otoccipitals (sensu Trueb 1973) broad and fused with frontoparietals, sutures well marked, frontoparietals paired, long and broad, with a very small interspace and covering most of the sphenethmoid; paired nasals somewhat broader than long, about one quarter as long as frontoparietals plus otoccipitals (Fig. 4); processus paraorbitalis of the nasal well developed and venterolaterally oriented. Each premaxillary with a strongly bent alary process (Fig. 5). Maxillary without teeth and only marginally overlapping premaxillary; ventral ramus of squamosal long, its zygomatic ramus very small and its otic ramus well developed; prevomers (sensu Trueb 1973) do not meet medially and nearly completely include the choanae (Fig. 6); pars lateralis of parasphenoid broad and long, pars medialis (cultriform process) long, nearly reaching posterior border of palatine bones; cartilaginous hyoid plate has large antero-lateral processes as well as bifurcate postero-lateral processes (Fig. 7), anterior process of postero-lateral process with bifurcate tip in the older specimen (ZMB 63291, see Fig. 7) but with a single tip in the younger one (ZMB 63292); hyalia without processes, postero-medial processes completely ossified, slightly bent and each showing a small postero-medial crista. Coracoids slightly angled, procoracoids cartilaginous, club-shaped and reaching laterally only to middle of coracoid, a thin rod-shaped, ossified clavicula is attached to the anterior margin of each procoracoid (Fig. 8). Sternum voluminous, omosternum lacking, xiphisternum with two lateral lobes. In the obviously younger specimen (ZMB 63292) the sternum is mostly cartilaginous (only corpus sterni and manubrium sterni with a few bone substances). In the older specimen (ZMB 63291) corpus sterni and manubrium are completely ossified and only lateral lobes are cartilaginous. Both specimens show two other differences regarding ossification of bones: (1) in the younger specimen there is a cartilaginous "bridge" between coracoid and scapula, in the older this "bridge" is ossified and both bones seems to be fused to a single one; (2) anterior part of cleithrum is ossified in both specimens; the posterior part is ossified in the older specimen but is cartilaginous in the younger specimen. Terminal phalanges T-shaped, cross part (of



Fig. 9. Rainforest habitat of *Oreophryne atrigularis* in the Wondiwoi Mts., 550 m a.s.l.

the T) relatively short. Eight nonimbricate presacral vertebrae, the third one with broadest transverse processes, sacral diapophyses broadly expanded, urostyle with a weakly developed bifide crista on its dorsal anterior half, which becomes single-ridged posteriorly.

Etymology. The specific epithet refers to the colouration of the throat. Ater (atra, atrum) is a Latin adjective and means black, and gularis is also Latin and means "belonging to throat".

Distribution. Known only from the type locality, the slopes and valleys between 350 and 750 m a.s.l. in the Wondiwoi Mountains west of the coastal village of Yeretuar, base of the Wandammen Peninsula, Irian Jaya.

Habitat and habits. *O. atrigularis* is one of the most abundant amphibians in the Wondiwoi Mountains. It lives in dense closed rain forest and in more open forest and the undergrowth varies from extremely sparse to areas with many shrubs, grasses and herbs (Fig. 9). Frogs were found on steep slopes, and also at the bottom of valleys and gorges, often long distances from water. At night males perched on leaves between 0.5 m and 2.5 m high. They were spaced at least several metres apart and no more than one male occupied the same shrub. Some males started calling from beneath the leaf litter at dusk, and then climbed on to small shrubs where they continued calling during the night. This suggests that the litter is used as a diurnal retreat by this species. Calling activity was most intense between shortly after dark and 9 p.m., but single call series were heard throughout the night. Calling males were found in May, July and August; the site was not visited during any other month.

Vocalization. Advertisement calls consist of series of notes. Most series start with notes having long and irregular inter-note intervals ("slow" notes). During the call sequence note intervals become shorter and more regular ("fast" notes) (Fig. 10). There are calls with only a few introductory notes and long phases of fast notes, others have equal parts of slow and fast notes, and there are also calls with many introductory slow notes and only a few fast notes at the end. Most call series last 15 to 30 s and are separated from each other by intervals of at least 4 s (usually more). In 30 call series, the call components with short and regular intervals contained a mean of 17.7 notes (SD 7.83, range 6-30). Call series end abruptly during fast note sequences. Mean note length of 319 notes was 198 ms (SD 16.2),

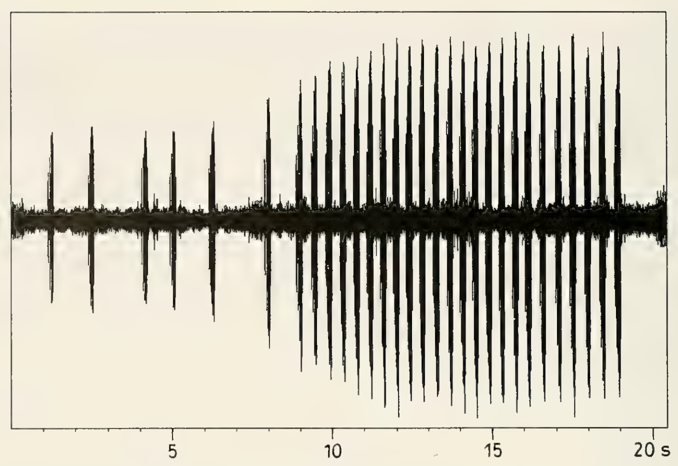


Fig. 10. Oscillogram of an advertisement call sequence of *Oreophryne atrigularis*. First six notes are of lower amplitude and the intervals between them are longer and irregular. These are followed by a sequence of 24 "fast" notes (see text). All recordings were made at temperatures between 22 and 24.5 °C.

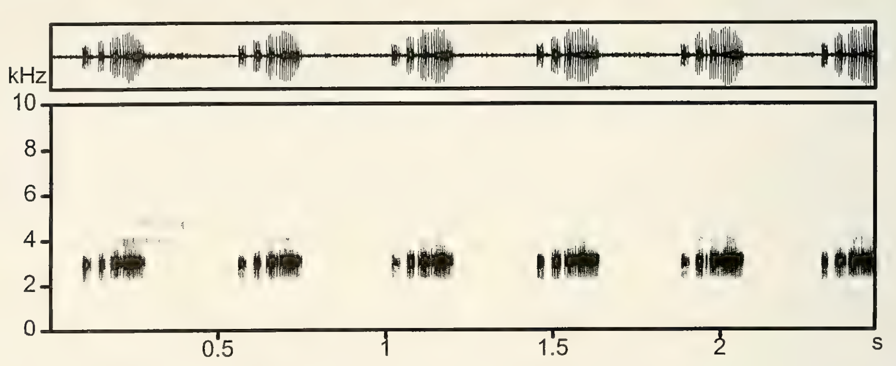


Fig. 11. Audiospectrogram (below) and oscillogram (above) of a series of six "fast" notes of *Oreophryne atrigularis*.

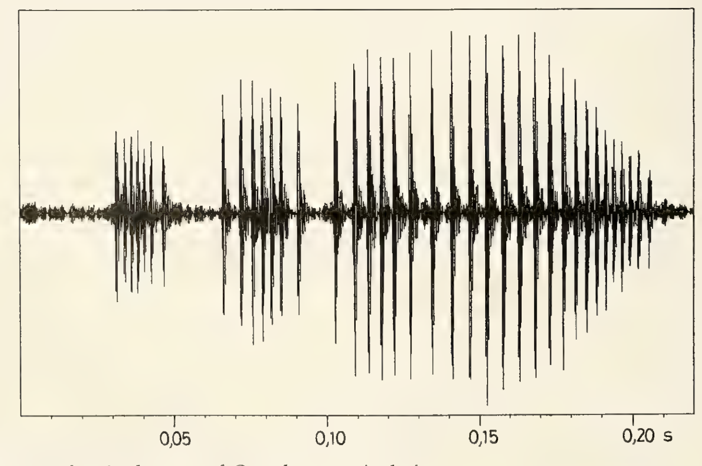


Fig. 12. Oscillogram of a single note of *Oreophryne atrigularis*.

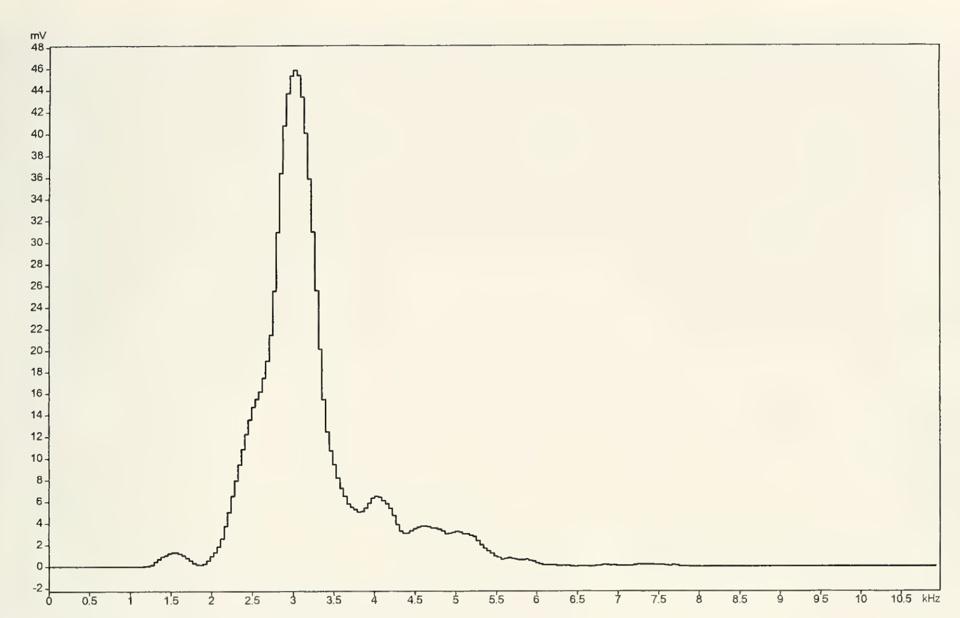


Fig. 13. Frequency spectrum of one note of *Oreophryne atrigularis.*

minimum length was 171 ms and maximum duration was 262 ms. Inter-note intervals between 290 fast notes had a mean duration of 226 ms (SD 18.6), a minimum of 190 and a maximum of 312 ms. Mean repetition rate of fast notes was about 3/s. Harmonics and frequency modulations are not discernible (Fig. 11). Notes are composed of distinct pulses. Pulses are arranged into three groups which are separated from each other by short intervals (Figs 11 and 12). The first pulse group typically consists of 6-8 pulses, the second group contains also 6-8 pulses but of higher amplitude, and the third group has the longest duration and most pulses (15-25). Moreover, there is an amplitude modulation in the latter group. Fundamental frequency is about 1.5 kHz and dominant frequency is around 3 kHz (Fig. 13). All calls were recorded at temperatures between 22 and 24.5 °C.

Comparison with other species. *Oreophryne atrigularis* differs from all previously described *Oreophryne* in its possession of a protruding and sharply defined snout, and in the distinctive black coloration of the throat and lateral surfaces of the head. Described *Oreophryne* from New Guinea also differ from *O. atrigularis* in the following features: *Oreophryne anthonyi* (Boulenger, 1897), *O. idenburgensis* Zweifel, 1956 and *O. inornata* Zweifel, 1956 are easily distinguished from *atrigularis* by their much larger size (snout-urostyle lengths of more than 40 mm vs 26.3 mm). *Oreophryne albopunctata* (van Kampen, 1909) has webbed toes and much shorter hind limbs. *O. brachypus* (Werner, 1898) has quite different mating calls (Tyler 1967) and is known only from the Bismarck Archipelago. *O. brevicrus* Zweifel, 1956 has much shorter hind limbs, smaller terminal discs on the fingers and toes and is a terrestrial species. *O. crucifera* (van Kampen, 1913) has webbed toes, the 3rd and 5th toe are of equal length and the procoracoid reaches the scapula. We have examined specimens of *O. flava* Parker, 1934 from the AMNH and this species clearly differs from *O. atrigularis* in having the procoracoid reaching the scapula and the 5th toe longer than the 3rd. We have examined the type (SMF 4197) of *O. geislerorum* (Boettger, 1892) and it has very short tibiae (TL/SUL of the type 0.39) and basal webbing between the toes. We have examined specimens of *O. insulana* Zweifel, 1956 from the AMNH. It differs from *O. atrigularis* in having a rounded canthus rostralis, snout not protruding, 3rd and 5th toe of equal length, and basal toe webbing. In *O. kampeni* Parker, 1934 the procoracoid reaches the scapula and the toes are webbed. *O. parkeri* has a very distinct tympanum, its toes are webbed and its 5th toe is longer than the 3rd (Loveridge 1955). *O. wolterstorffi* was treated as a member of the Hylidae by Werner (1901) and subsequently transferred to the microhylid genus *Oreophryne* by Tyler (1964). We have examined one specimen (ZMB 16853) which differs from *atrigularis* in its distinct toe webbing, shorter tibiae, and 5th toe longer than the 3 rd. The same suite of characters distinguishes *O. moluccensis* (Peters & Doria

Fig. 14. *Oreophryne wapoga*, spec. nov., paratype MZB. Amph. 7359; in dorsolateral view. This is the only specimen in the type series which has a longitudinal mid-dorsal line.

Fig. 15. Ventral view of *Oreophryne wapoga*, spec. nov., same specimen as in Fig. 14.

Fig. 16. Dorsal view of three paratypes and the holotype (second specimen from left in the top row) of *Oreophryne wapoga*, spec. nov. and of four paratypes of *Oreophryne atrigularis*, spec. nov. (bottom row). Visible numbers are field numbers.

Fig. 17. Ventral view of three paratypes and the holotype (second specimen from left in the top row) of *Oreophryne wapoga*, spec. nov. and of four paratypes of *Oreophryne atrigularis*, spec. nov. (bottom row).

1878), of which we examined types of its synonym *O. senckenbergiana* Boettger, 1895 (SMF 4203, lectotype; SMF 4204 and 4205, paralectotypes).

The types of *O. biroi* (originally described as *Sphenophryne biroi* by Méhely 1897) were stored at the Museum of Natural History in Budapest and are lost. According to Häupl et al. (1994) one syntype received in exchange from the Natural History Museum Budapest on 18.XI.1898 was deposited as NMW 19825 in the Naturhistorisches Museum in Wien. In fact, four specimens are catalogued under this number (NMW 19825: 1-4). From Méhely's papers (1897, 1901) it is clear that his original description was based on only two specimens with snout-vent lengths of 17 mm and 8.5 mm, collected near Friedrich-Wilhelmshafen (today Madang). In 1900 Méhely received various specimens from Sattelberg (about 250 km east of the type locality), the largest being 25 mm long, which he ascribed to *S. biroi*. It is extremely likely that the four specimens in the Vienna museum also originated from Sattelberg. Because Méhely himself regarded these specimens as belonging to *S. biroi*, they should serve as important material in future comparative studies (although they are certainly not syntypes of *Oreophryne biroi* and they are larger than the types from Friedrich-Wilhelmshafen). The SUL of these 4 now bleached specimens ranges from 20.6 to 22.5 mm and they are therefore similar in size to *O. atrigularis*. However, all have traces of webbing between the toes, their snouts are not protruding, TL/SUL ranges between 0.42-0.45, the 5th toe is longer than 3rd and Méhely did not mention a black loreal region and a blackish throat in his description of freshly preserved material. We have studied a syntype of *Mehelyia affinis* Wandolleck, 1911 (NMW 19826), which was regarded as a synonym of *O. biroi* by van Kampen (1923) and Parker (1934). There are sufficient differences between this syntype and the four *O. biroi* specimens to suggest that they represent different taxa, and the differences between this specimen and *O. atrigularis* are the same as those between *O. biroi* and *O. atrigularis*. This statement applies equally to other names regarded as synonyms of various *Oreophryne* species today. None of the species descriptions within the genus *Oreophryne* mention a black loreal and gular region, and a projecting snout with a well-marked canthus rostralis.

Oreophryne wapoga, spec. nov.

Figs 14-20

Types. Holotype: MZB Amph. 7358, adult male, collected by S.J. Richards and D. Iskandar on 11.IV.1998 at an altitude of 1070 m asl at Wapoga Alpha Exploration Camp (136°34'423"E, 3°08'687"S), Wapoga River headwaters, Irian Jaya, Indonesia. – **Paratypes:** Four adult males with inventory numbers ZMB 63435, SAMA R55923 and MZB Amph. 7359-60. All data as for holotype except that ZMB 63435 collected on 12.IV.1998, and SAMA R55923 collected on 16.IV.1998 by M. Moore.

Diagnosis. *Oreophryne wapoga* was not studied osteologically because of scarcity of material. However, superficial dissection of the pectoral girdle revealed the presence of reduced clavicles, demonstrating that this species belongs to the genus *Oreophryne*. Based on external morphology (Figs 14, 15) it appears to be closely related to *O. atrigularis*. Diagnostically important characters are the same as outlined for that species. From *O. atrigularis* it can be distinguished by a dark brown (not black) throat, a more spotted pigmentation, concealed parts of hind limbs are yellowish not red, a shorter head (HL/SUL 0.339-0.357), bigger eyes (ED/SUL 0.122-0.131), greater body size (males 21.8-23.3 mm SUL) and by different advertisement calls.

Description of the holotype

Measurements and ratios of body proportions are given in tables 2 and 3. General body shape same as for preceding species. Ground colour dorsally pale grey in fixative and beige in life, venter cream coloured. A solid black band extends from insertion of upper arm to tip of snout, bordered behind eye by a whitish stripe. Dorsum and head with irregular brownish marbling extending to tip of snout. Shape of the pupil oval, reddish-brown in life. Darker pigments concentrated dorsolaterally extend from eyes to middle of iliae. Flanks and dorsal surfaces of limbs covered with diffuse (not clearly marked and differing in size) brown spots. Posterior sides of thighs dusted with many very minute spots. All fingers and toes dark brownish above with exception of a whitish spot near base of terminal disk. Throat densely spotted, with irregular dark brown spots merging into each other. More isolated dark spots on chest and ventral sides of extremities, posterior of belly unspotted. Palms and soles greyish-brown, ventral side of fingers and toes inconspicuously spotted.



Fig. 18. Ventral view of right hand (left) and of right foot (right) of *Oreophryne wapoga*, spec. nov. (ZMB 63435).

Variation in the type series. Measurements and body proportions of the type series are given in table 2 and 3 and variation of coloration in comparison to that of *O. atrigularis* is shown on Figs 16 and 17. Coloration of preserved animals is very similar to that of living ones. One specimen MZB. Amph. 7359

Tab. 2. Measurements (in mm) of the type series (5 males) of *Oreophryne wapoga*.

Number	MZB. Amph. 7358	MZB. Amph. 7359	MZB Amph. 7360	ZMB 63435	SAMA R55923
SUL	23.0	23.3	22.8	22.1	21.8
TL	11.8	11.9	11.7	11.8	10.7
TaL	7.8	7.7	7.7	7.1	6.6
L4T	11.0	10.9	10.6	10.6	9.5
L3T	8.1	8.0	7.8	8.0	7.6
T4D	1.3	1.3	1.1	1.2	1.0
F3D	1.4	1.3	1.3	1.2	1.1
HL	7.6	7.7	7.6	7.5	7.4
HW	7.8	7.9	7.8	7.7	7.9
L1T	1.8	2.1	1.9	1.8	2.0
LMT	1.3	1.2	1.1	1.0	1.1
END	2.0	2.4	2.4	2.1	2.1
IND	2.2	2.6	2.5	2.4	2.4
ED	2.8	3.0	2.8	2.9	2.7
TyD	0.8	0.8	0.7	0.7	0.9
FD	7.1	7.2	7.0	7.4	7.1

Tab. 3. Body proportions of the type series (n=5 males) of *Oreophryne wapoga*.

Ratio	Mean	SD	Range
TL/SUL	0.51	0.014	0.49-0.53
HL/SUL	0.334	0.0045	0.330-0.339
HW/SUL	0.345	0.0076	0.339-0.357
HL/HW	0.969	0.012	0.948-0.974
ED/SUL	0.126	0.0039	0.122-0.131
END/SUL	0.097	0.0072	0.087-0.105
F3D/SUL	0.0556	0.0038	0.0505-0.0608

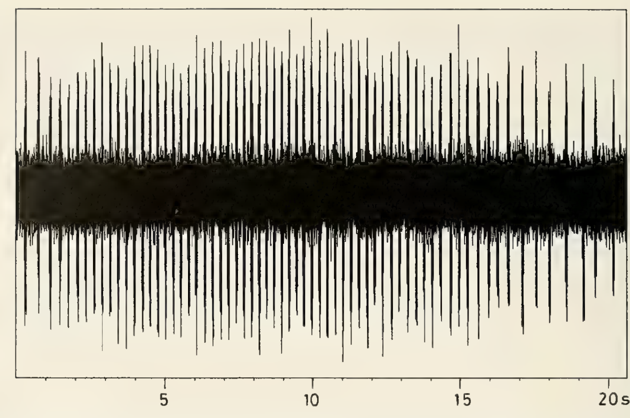


Fig. 19. Oscillogram of an advertisement call of *Oreophryne wapoga*. Notes at the beginning and at the end of the series are produced at a slower rate than the "fast" notes in the middle of the series.

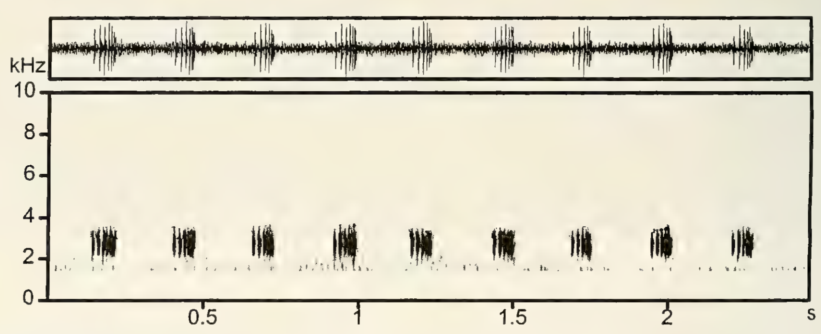


Fig. 20. Oscillogram (above) and audiospectrogram (below) of a sequence of nine "fast" notes of *Oreophryne wapoga*. Air temperature 20.6 °C.

has a relatively broad (in comparison to *O. atrigularis*) mid-dorsal line, bordered by irregular dark brown stripes. Remaining specimens lack a mid-dorsal line. Ground colour of dorsum grey in four specimens and brown in one specimen. Light dorsum bordered by an irregular dark longitudinal stripe dorsolaterally is typically for all specimens. Dorsal surface of head, body and limbs more or less spotted in all specimens, concealed parts of hind limbs yellowish and dusted with minute flecks. Flanks in four specimens lightly marbled below and more strongly marbled above; one specimen shows nearly uniform brown flanks. Small whitish spots or strokes are conspicuous on almost all penultimate phalanges near base of terminal disks. One specimen has a uni-coloured dark brown throat, others have some lighter regions within dark coloration. Chest and anterior of belly with more isolated brown spots, posterior of belly without or with only a few spots. Ventral surfaces of limbs more or less unspotted. One specimen with a cross-like figure on the chest. An inconspicuous w-shaped mark in the scapular region occurs in all specimens. Length of fingers and toes and size of terminal discs varies only a little, a "typical" state is shown on Fig. 18.

Etymology. Named for the Wapoga River headwaters where the type series was collected. Wapoga is considered as an invariable noun in apposition to the generic name.

Distribution. Known from the type locality in the Wapoga River headwaters, Irian Jaya, Indonesia. Based on morphology and structural features of vocalizations a population of frogs on Yapen Island appears to be closely allied to *Oreophryne wapoga* from the Wapoga River headwaters. We tentatively recognise this population as *O. wapoga* pending further studies (see below).



Fig. 21. Male of *Oreophryne cf. wapoga* from Yapen Island (ZMB 62625).

Habitat and habits. Male *Oreophryne wapoga* called from heights of between 1.0 and 2.5 m on leaves of understorey plants in lower-montane rainforest. All specimens were collected from a relatively dry ridge, and none were heard calling in the extremely moist gullies at the Wapoga site. Males called sporadically on clear, dry nights, and calling intensity increased during rain.

Vocalization. The advertisement call of *O. wapoga* has a similar basic structure to that of *O. atrigularis*; a long series of notes in which the initial notes of a call series have relatively long inter-note intervals followed by "fast" notes with much higher repetition rates. Note repetition rate of a call sequence may decrease again at the end of the call sequence (Fig. 19). Notes consist of 3-7 pulses, and terminal pulses are uttered at a higher rate than those at the beginning of the note (Fig. 20). 221 notes of two specimens were recorded at an air temperature of 20.6 °C. Their mean length is 76 ms (SD 11.9), minimum length 49 ms and maximum length 104 ms. 135 intervals between "fast" notes have a mean duration of 179 ms (SD 33.7), range 102-241 ms. Total call length varied from 10 to 31 s. The number of "fast" notes within 4 calls varies from 20-64. Fundamental frequency is around 1.5 kHz and dominant frequency is between 2.5 and 3 kHz. Repetition rate in sequences of "fast" notes was between 4 and 6 notes/s.

Comparison with other species. *O. wapoga* is morphologically similar to *O. atrigularis* and differs from other species of the genus in the same characters described in the "Comparison with other species" section for that taxon. The morphological similarity of the Wondiwoi and Wapoga populations initially led us to suspect that they might represent a single variable taxon. However, a number of consistent differences in morphology and call structure lead us to recognise the two populations as distinct species. The two taxa are of similar size although the SUL of *O. wapoga* is slightly and significantly greater (mean 22.6 mm) than that that of *O. atrigularis* (mean 21.5 mm; $t=3.5$, $P=0.00081$). The head of *O. wapoga* is longer than that of *O. atrigularis*; HL/SUL of the former 0.330-0.339, of the latter 0.278-0.321, $t=6.25$, $P=<0.0001$; HL/HW for *O. wapoga* 0.948-0.974, for *O. atrigularis* 0.735-0.888, $t=9.08$, $P<0.0001$; HW/SUL for *O. wapoga* 0.339-0.357, for *O. atrigularis* 0.333-0.404, $t=3.96$, $P=0.00024$; ED/SUL for *O. wapoga* 0.122-0.131, for *O. atrigularis* 0.102-0.120, $t=6.30$, $P<0.0001$. Tibia length of *O. atrigularis* is slightly higher than that of *O. wapoga*; $t=2.87$, $P=0.0038$.

There are consistent differences in coloration between the two species. Throat colour of *O. atrigularis* is uni-coloured black while that of *O. wapoga* is dark brown and speckled. Concealed parts of the hind limbs are red in *O. atrigularis*, without minute dark spots; those of *O. wapoga* are yellowish and dusted with fine specks. Notes within advertisement calls of *O. atrigularis* are much longer (171-

262 ms vs 49-104 ms in *O. wapoga*), have a complicated substructure showing 3 different pulse groups, and have a higher number of pulses (more than 20 vs 3-7 in *O. wapoga*). Internote intervals within fast note sequences have a duration of 190-312 ms in *O. atrigularis* and of 102-241 ms in *O. wapoga* (t=18.6). As a result mean note repetition rate in the very fast note sequences was about 3/s in *O. atrigularis* and about 6/s in *O. wapoga* at a slightly lower temperature. The opposite trend would be expected if temperature was solely responsible for differences in note repetition rate. Sequences of fast notes in about 50 call series from *O. atrigularis* consisted nearly exclusively of less than 30 notes whereas 3 out of 4 series of fast notes in *O. wapoga* contained more than 30 notes, and two of these had more than 60 notes.

Oreophryne cf. *wapoga* on Yapen Island

Eight frogs collected by the senior author about 15 km north-east of Serui on Yapen Island closely resemble *O. wapoga* and we tentatively assign them to this species. However we exclude them from the type series because slight but consistent morphological differences raise some doubts about the relationships of the two populations. Two males (ZMB 62159 and 62160) were collected on 10 September 1999 and five males (ZMB 62622 and 62624-27) and one female (ZMB 62623) were collected on 18 and 19 May 2000 at an altidude of 610 to 630 m a.s.l. Selected body proportions are presented in table 4. Statistically the Yapen series differs significantly from Wapoga animals in the following characters: mean snout-urostyle length in *O. wapoga* males 22.6 mm, in Yapen males 20.9 mm (t=3.61, P=0.0034); mean ratio of head length/snout-urostyle length in *O. wapoga* 0.334, in frogs from Yapen 0.310 (t=3.77, P=0.0030); and mean ratio of head length/head width in *O. wapoga* 0.969 and in Yapen specimens 0.862 (t=4.09, P=0.0017). The only female from Yapen has a SUL of 22.5 mm and has large whitish and possibly immature ovarian oocytes that measure about 2 mm in diameter.

There are also differences in coloration between *O. wapoga* and wapoga-like frogs from Yapen. The blackish colour laterally on the head and on the throat is less intensive in most specimens from the Yapen population, and in two specimens (ZMB 62159 and 62160) is missing entirely. However the coloration of some frogs (for example ZMB 62622 and 62627) is remarkably similar to that of a paratype (ZMB 63435) of *O. wapoga*. None of the eight Yapen frogs has a whitish mid-dorsal longitudinal line (Fig. 21).

The advertisement calls of Yapen specimens consist of single creaks, small groups of creaks with comparatively long and often irregular inter-note intervals, and longer series of creaks. Notes consist of 4 to 5 clearly defined pulses (Fig 22). Longer call series often start with notes having long internote-intervals, and in the course of the series intervals become shorter and more regular. Longer series have a very similar structure and number of notes/s to those documented for *O. wapoga*. Some males called from under leaf litter and others called from shrubs at heights between 0.30 and 1.50 m.

Both colouration and advertisement call structure distinguish the Yapen Island population from *O. atrigularis*. Although differences in morphology and possibly in calling behaviour between *O. wapoga* from the type locality and *wapoga*-like frogs from Yapen Island doubtless exist, we believe that the data currently available do not support recognition of the Yapen population as a distinct species.

Tab. 4. Body proportions of a series of seven males and one female of *Oreophryne* cf. *wapoga* from Yapen Island.

Ratio	Mean	SD	Range
TL/SUL	0.53	0.019	0.48-0.53
HL/SUL	0.31	0.013	0.29-0.33
HW/SUL	0.36	0.018	0.34-0.39
HL/HW	0.86	0.057	0.74-0.93
ED/SUL	0.124	0.0052	0.116-0.132
END/SUL	0.095	0.0018	0.092-0.098
F3D/SUL	0.055	0.0049	0.047-0.060

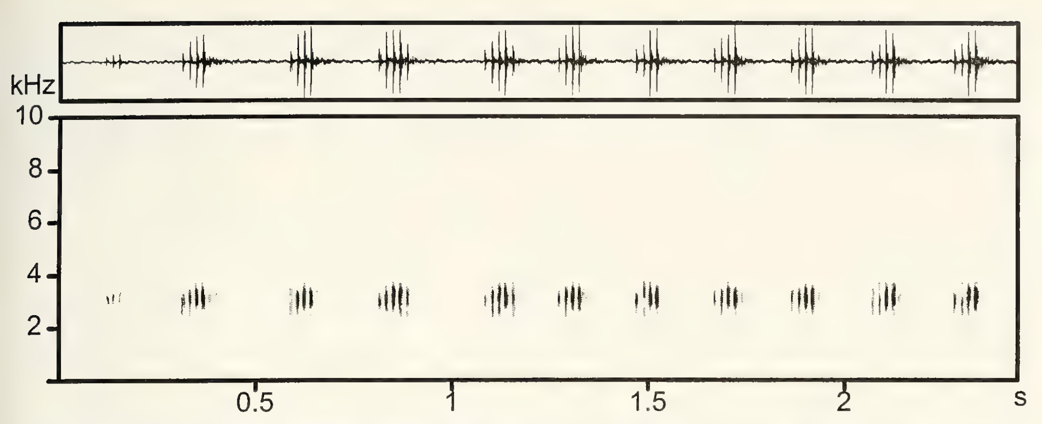


Fig. 22. Oscillogram (above) and audiospectrogram (below) of a sequence of 11 "fast" notes of *Oreophryne* cf. *wapoga* from Yapen Island. Air temperature during recording 22.5 °C.

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A new monitor lizard from Panay Island, Philippines

(Reptilia, Sauria, Varanidae)*

Maren Gaulke & Eberhard Curio

Gaulke, M. & E. Curio (2001): A new monitor lizard from Panay Island, Philippines (Reptilia, Sauria, Varanidae). – Spixiana **24/3:** 275-286

Varanus mabitang, spec. nov. is described from Antique Province, Northwest Panay, Philippines. The new species is closely related to *V. olivaceus* from South-Luzon, Catanduanes, and Polillo Islands, Philippines, with which it shares the general morphological appearance, the blunt teeth, a large caecum, and several aspects of its highly specialized feeding habits. It differs from *V. olivaceus* by its almost uniform black colouration, the different head shape with a slightly domed snout and a strongly bulging nasal and temporal region, the finer scalation and consequently higher standard scale counts, the tail with a triangular cross section and a well developed double keeled scale row on its crest, the strongly keeled ventrals, and an exclusively vegetarian diet at least in the holotype.

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Introduction

At present, the number of monitor lizard species occurring on the Philippine Islands is somewhat unclear. Well known is the allopatric distribution of three different forms of the *Varanus salvator* group, *V. s. marmoratus*, *V. s. cumingi*, and *V. s. nuchalis*, throughout the Philippines, and the occurrence of *V. olivaceus*, an endemic species of the Luzon region. The type locality of *V. rudicollis* is given by Gray (1845) with "Philippines". The specimen was collected by H. Cuming, supposedly at Borongan on Samar Island. However, as is known in the meantime, several of Cuming's distribution records are erroneous. No conclusive evidence that this species occurs on the Philippines has been forthcoming since then, and it is widely assumed that the type locality given for *V. rudicollis* is erroneous (e.g. Taylor 1922, Bennett 1998). Other authors (Mertens 1959, Auffenberg 1976) list it as part of the Philippine varanid fauna. Auffenberg (1988) mentions that it may be part of the Philippine fauna in spite of statements to the contrary, referring to a preserved adult specimen (FSM) supposedly coming from the Philippines. Auffenberg (1976) also lists *V. dumerili* for the Philippines, but corrects this as an erroneous report later on (Auffenberg 1988). All monitor lizards known from the Philippines so far belong to the large sized group, with a total length of 150 cm or above.

The recent discovery of another large monitor lizard (a specimen with a total length of 175 cm still was considered as modestly large by hunters) on one of the biggest Philippine islands suggests that this country may still hold some more monitors to be discovered in the future. In view of the highly secretive life habits of *V. mabitang*, it is not too surprising that it escaped scientific discovery until

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recently. To our present knowledge, this arboreal lizard is confined to some of the remaining rainforest patches on Panay, where it obviously spends most of the time hiding in tree holes or on branches of high forest trees. Its completely dark colouration further helps to disguise the shape of this animal within its natural, shady and densely vegetated surrounding. The newly discovered species is most closely related to *V. olivaceus*, with which it shares the general morphological appearance. Like *V. olivaceus*, *V. mabitang* has slit-like nostrils, blunt teeth, very large feet, enlarged scales on the head, and a large caecum.

Material and methods

About four years ago (in 1996), during the process of setting up a base for the work of the Philippine Endemic Species Conservation Project (PESCP) on Panay, E. C. was informed by different hunters from the NW Panay area about the existence of a black, very large, arboreal monitor lizard. This lizard was said to be very rare compared to the West Visayan form of the water monitor *(V. salvator nuchalis)*, which is widespread and common all over Panay. All informations pertaining to this "mystery lizard" were collected. However, it took more than three years until the first specimen of this lizard could be examined by project members. Since the project did not hold a collecting permit for reptiles during that time, the animal was released after a non invasive examination and picture taking.

To obtain data on the habitat, in March 2001 M. G. made a field trip to the area where the animal had been caught. The trip was guided by the project member N. Paulino, a former hunter with a profound knowledge of the flora and fauna within his range, the person whom we owe most of the information regarding the biology of the new species.

Only when we were in the possession of a permit including reptiles (Gratuitous Permit No. 93), N. Paulino was asked to secure a second specimen. It was finally caught on May 19th, 2001, and brought to the PESCP research station at Sibaliw in the West of the NW Panay Peninsula. The animal was kept alive in a large outdoor enclosure, until M. G. and the cooperating DENR member of PESCP, Mr. Nilo Subong from Kalibo, Aklan Province, Panay, were able to go there. For observations, picture taking, and trials on its food choice, the animal was kept inside the enclosure for another week (May 29th to June 4^{th,} 2001).

Description of pholidosis (using a magnifying lense) and colouration, and biometric measurements were done immediately after death. For the first two days the animal was preserved in 7 % formalin, afterwards transferred to 70 % alcohol. On June 23th, 2001 the specimen was exported to Germany (CITES Export Permit No. 5571, issued by the Department of Environment and Natural Resources, Protected Areas and Wildlife Bureau, Quezon City, and CITES Import Permit No. E: 1884/01, issued by the "Bundesamt für Naturschutz", Bonn) for further examination and description. The body cavity was opened to determine the reproductive status, the development of the gastrointestinal tract, and its contents. For a closer examination of its dentition the head was x-rayed with a Faxitron 805 (Field Emission Corp. Ore., USA) in ZSM, and to obtain cross-sections without cutting, parts of the tail were moulded using "Palgat Plus" (ESPE Dental-Medizin GmbH & Co. KG, Seefeld), and the form later on filled with silica rubber, to obtain an easy to cut positive. Isotopic analyses were performed by the GeoBio-Center, Munich, with a Finnigan MAT Delta S. A Carlo Erba (EA 1108) elementar analyser was coupled to the MAT by a Finnigan Conflo-Interface. $^{15}N/^{14}N$ ratios are given by elevational delta notation ($\delta^{15}N$) *versus* air N_2 as relative standard.

For comparison, four *V. olivaceus* from ZFMK, Bonn, and two from PNM, Manila, were investigated. Not all scale counts and measurements could be taken from all individuals, as some had scars covering large parts of their bodies. For further comparison, data from Auffenberg (1988) were taken. He gives some scale counts and measurements for more than 100 specimens of *V. olivaceus*, and very comprehensive data on the feeding habits and biology of this monitor lizard.

Museum abbreviations: FSM: Florida State Museum, Gainesville; PNM: Philippine National Museum, Manila; ZFMK: Zoologisches Forschungsinstitut und Museum A. Koenig, Bonn; ZSM: Zoologische Staatssammlung München.

Results and Discussion

Varanus mabitang, spec. nov.

Type. Holotype: PNM 7272, female, caught in the South Pandan Forest, ca. 250 m a. s. l., Municipality of Pandan, Antique Province, NW Panay Island, Philippines, on 19 May 2001 by Narciso Paulino. – Due to the scarcity of this animal we collected no paratypes and we strongly advise to refrain from collecting further specimens at least as long as its population status must be considered as critically endangered. However, we possess some measurements, observations, and pictures from a second specimen, which actually was caught prior to the holotype, end of October 2000 (same person and same locality as holotype), and released unharmed after examination.

Diagnosis. *V. mabitang* can be distinguished from *Varanus olivaceus* Hallowell, 1856, as follows:

- Dorsal side black with scattering of tiny yellow dots on the posterior end of some scales of neck, back, and extremities (vs. greenish gray with darker transverse bands across neck, back, and tail, and extremities irregularly mottled yellowish-olive and gray);
- ventral surface of head, neck, tail, extremities, and belly dark gray to blackish (vs. grayish, grayish green, or yellow-gray with 3-4 longitudinal brownish black to black stripes on throat);
- nuchal scales adjoining head scales smaller than these (vs. same size);
- extremely small scales on neck, body, and tail, and consequently very high standard scale counts: scales from rictus to rictus 70 (vs. a maximum of 61, average 58,4), transverse rows of ventral scales from gular fold to a theoretical line connecting the insertion of hindlegs ventrally 124 (vs. a maximum of 121, average 109), transverse rows of dorsals from gular fold to a theoretical line connecting the insertion of hindlimbs dorsally 138 (vs. a maximum of 122, average 112), Tab. 1;
- tail triangular in cross section, upper scale crest with a well defined, double, longitudinal keel (vs. irregular oval in cross section, low double keel on tail hardly discernible), Fig. 1;
- head elongate, snout region slightly domed (vs. more massive with sloping snout region), Fig. 2;
- cranial table with well developed bulges above temporal regions (vs. flat);
- ventrals strongly keeled (vs. smooth or feebly keeled);
- scales of tail strongly keeled throughout entire length (vs. tail scales close to vent smooth), Fig. 3;
- exclusively vegetarian diet at least in the holotype (vs. a balanced molluscivorous-frugivorous diet).

Description of holotype (Figs. 4-7)

Habitus slender. Head forming a small, elongate triangle from above, with pointed and slightly domed snout. Nostril closer to tip of snout than to eye. Narial opening slit-like, angled upward posteriorly. Canthal ridge well developed between eye and nostril. Nasal region swollen, with a

Tab. 1. Scalation differences between *V. mabitang* and *Varanus olivaceus*. If no n is given, based on one individuum only. XVII. Scales from rictus to rictus in a straight line; XIX. Scales around midbody; XX. Transverse rows of ventral scales from gular fold to a theoretical line connecting the insertion of hindlegs ventrally; XXI. Transverse rows of dorsal scales from hind margin of head to gular fold; XXII. Transverse rows of dorsal scales from gular fold to a theoretical line connecting the insertion of hindlegs dorsally.

characteristics	*Varanus mabitang*, holotype	*Varanus olivaceus*, counts of specimens in ZFMK & PNM		Auffenberg (1976)	Auffenberg (1988)	
XVII	70 (n=2)	56.5 (n=4)	51-61	48	58.4 (n=106)	50-61
XIX	212	179.4 (n=5)	165-200	186	186.1 (n=106)	169-214
XX	124	104 (n=5)	95-107	111	109 (n=106)	101-121
XXI	53	42.4 (n=5)	40-45			
XXII	138	112.2 (n=5)	105-122			
Ventrals	strongly keeled	smooth (n=6)		not mentioned	feebly keeled (n=106)	
Double crest on tail	high, well developed	low, hardly discernible		not mentioned	low	

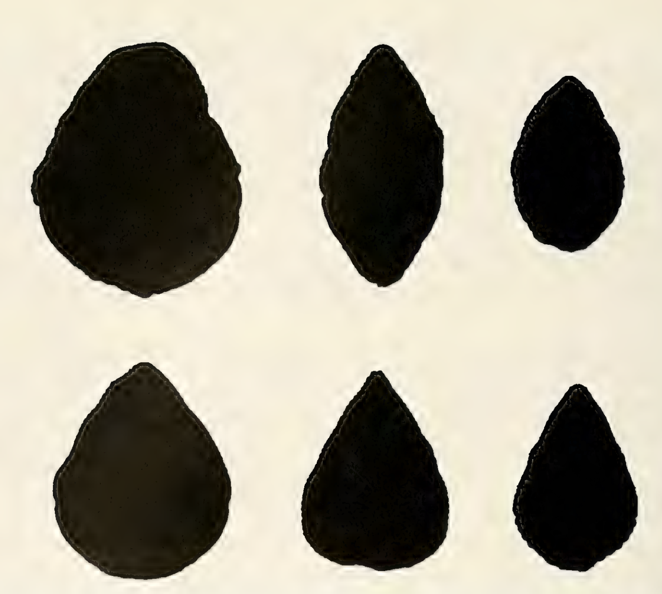


Fig. 1. Cross sections of the tail of *V. mabitang* and *V. olivaceus* (both females of almost same size), showing shape differences at one, two, and three head length behind vent (from left to right). The tail of *V. mabitang* (below) has a triangular shape in cross section, while the tail of *V. olivaceus* (above) is irregular oval.

median, longitudinal concave groove. Parietal region with prominent bulges above temporal regions. Two enlarged supraoculars left and right, distinctly longer than broad. Scale covering the pineal organ slightly enlarged, roundish, black with a yellowish-whitish centre. Scales on dorsal surface of head flat, relatively large, polygonal, largest in the intraorbital and parietal area. Each scale with six to eight pustules (plaques *sensu* Auffenberg 1994). Scales on sides of head in temporal region very small, oval. Scales on sides of head between eye and snout and below eyes enlarged, roundish to polygonal, with several pustules on each.

There are 10 maxillary teeth in one half of the jaw, they are roundish in transverse section, blunt posteriorly and conical anteriorly. The last two are very short, the following four are the longest, and the first four again small. There are five roundish, conical premaxillary teeth. The thirteen dentary teeth are round and blunt, gradually increasing in size posteriorly. Both in the alive and freshly dead lizard, the dentary teeth do not extend beyond the gum, being visible only as almost translucent, flat and round ovals within the gum.

Neck long and slender. Dorsal neck scales anteriorly roundish to ovally broadened, smaller than adjoining head scales. Posterior nuchal scales elongate, very small, and high domed; surrounded by wide interspaces with minute intercalary granules; each nuchal scale bearing a pore at its posterior edge. Dorsal scales longish oval, surrounded by minute intercalary granules; smallest between front limbs but not smaller than posterior nuchal scales, gradually increasing in size towards tail; keeled, with keels becoming much more pronounced posteriorly. Scales on sides of dorsum smaller than along the middle. Scales on neck and dorsum arranged in relatively regular transverse rows.

Scales below head enlarged at snout region, otherwise small; gular scales longish oval, arranged in more or less regular transverse rows.

Ventral scales larger than dorsals, longish rectangular, strongly keeled, with a well defined pit (external opening of a scale pore) on posterior part on each. On the border between ventrals and dorsals, each ventral scale row divides into two dorsal scale rows.

Dorsal scales of limbs longish, partly rectangular, high domed on front limbs and keeled on hind limbs, keels more pronounced on lower limb. Scales on undersurface of front- and hindlimbs roundish and flat. Very large, long fore- and hindfeet, with long and slender toes and very long, strong, curved claws (Fig. 4).

Scales on tail rectangular, strongly keeled, arranged in irregular whorls; scales larger on ventral than on dorsal side, the anterior ventral scale rows divide into two dorsal scale rows in irregular

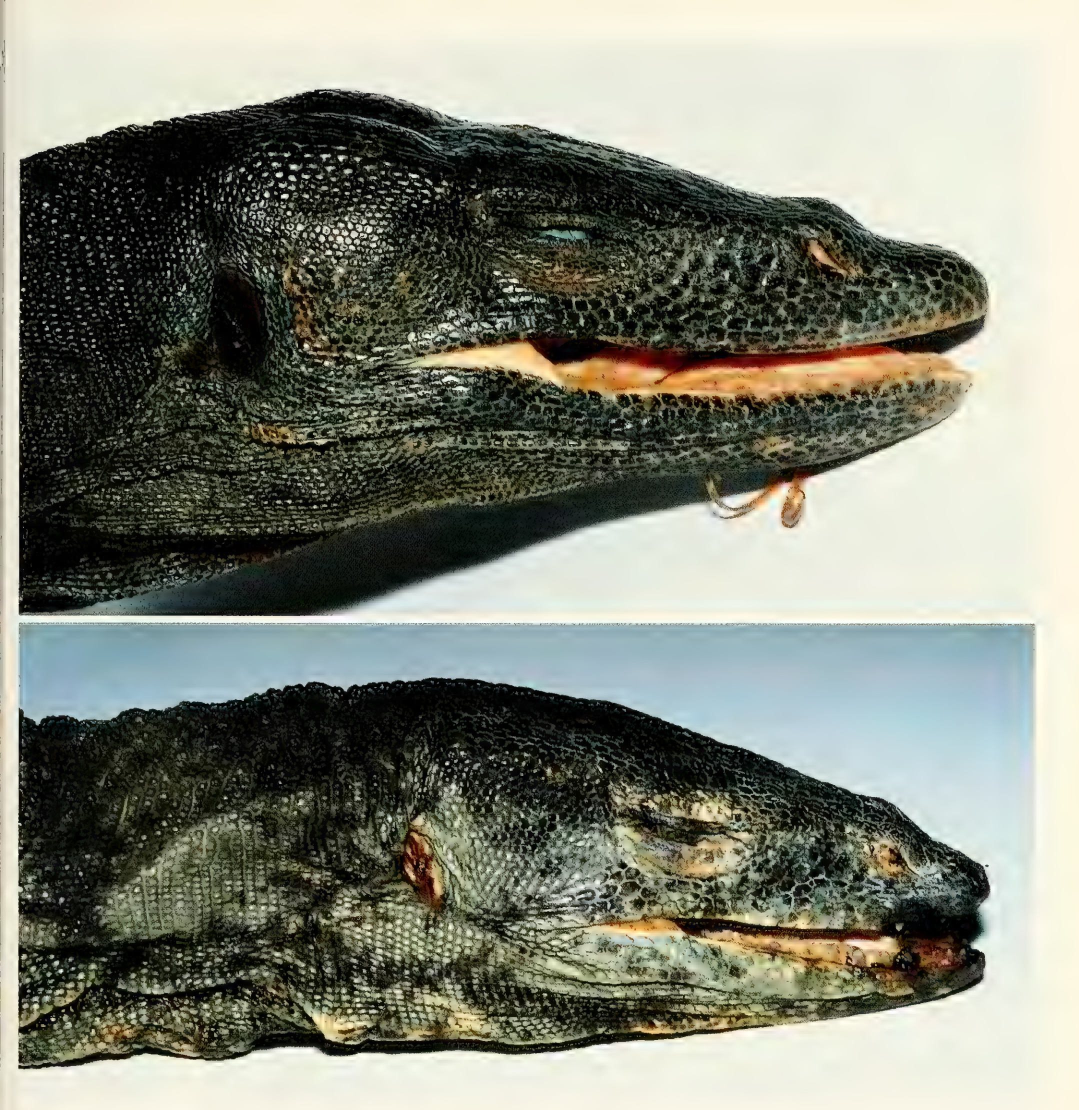


Fig. 2. Profiles of *V. mabitang* (PNM 7272) and *V. olivaceus* (ZFMK 57589), showing the more pointed and slightly upward turned snout of *V. mabitang* (above) and the sloping snout region of *V. olivaceus* (below). Both animals are females of almost same size.

distances at the tail base, after 12 scale rows every second ventral row divides, and after about one third of the tail, each ventral row divides into two dorsal rows. Upper crest of tail with prominent, longitudinal double keeled scale row. Tail slender, triangular in cross section, with a sharp upper edge defined by the double keel (Figs. 1 and 3).

Measurements. I. Total length: 1268 mm; II. Snout vent length: 527 mm; III. Tail length from cloaca to tip of tail: 741 mm, with some centimetres of tip missing; IV. Length of hindlimb from inner insertion of hindlimb to end of longest toe without claw: 227 mm; V. Length of forelimb from inner insertion of forelimb to end of longest toe without claw: 188 mm; VI. Length of head from tip of snout to anterior margin of tympanum: 89.9 mm; VII. Head width (maximum width between eyes and tympanum): 43.85 mm; VIIIa/VIIIb. Head height (above eye/maximum height between eyes and tympanum): 32.90 mm/35.00 mm; IX. Distance from anterior margin of eye to middle of nostril: 27.20 mm; X. Distance from middle of nostril to tip of snout: 21.85 mm; XI. Distance from anterior

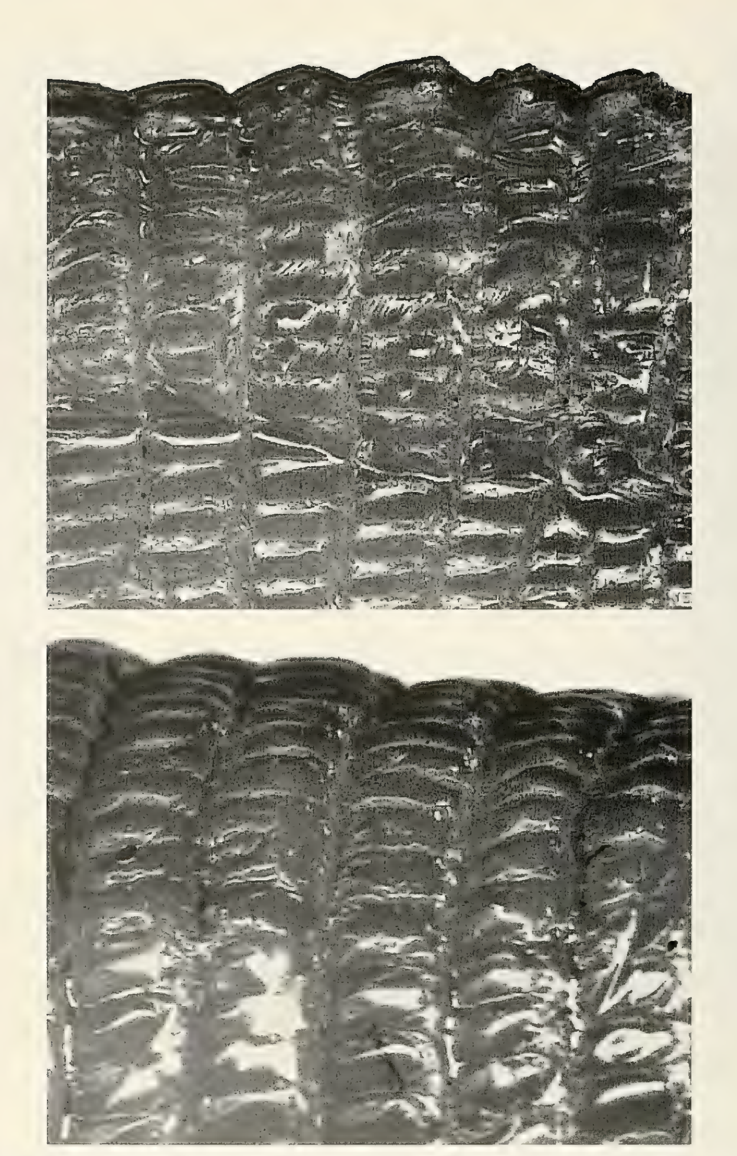


Fig. 3. Tail scalation of *V. mabitang* (above) and *V. olivaceus* (below) at one head length behind vent. Same animals as Figs 1 and 2.

margin of tympanum to anterior margin of eye: 42.30 mm.

Proportion indices. XII. Relative tail length (III:II): 1.41 (several cm of tail are missing!); XIII. Position of nostril between tip of snout and eye ((IX:X): 1.25; XIV. Position of nostril to snout tip ([VI-XI]:IX): 1,75; XV. Relative head length in relation to head width (VI:VII): 2.05; XVI. Relative head length in relation to maximum head height (VI:VIIIb): 2.57.

Scale counts. XVII. Scales from rictus to rictus in a straight line: 70; XVIII. Scales around tail base: 113; XIX. Scales around midbody: 212; XX. Transverse rows of ventral scales from gular fold to a theoretical line connecting the insertion of hindlegs ventrally: 124; XXI. Transverse rows of dorsal scales from hind margin of head to gular fold: 53; XXII. Transverse rows of dorsal scales from gular fold to a theoretical line connecting the insertion of hindlegs dorsally: 138; XIII. Scales around neck before gular fold: 160; XXIV. Ventrals from tip of snout to gular fold: 117; XXV. Supralabials: 35.

Weight. 1850 g.

Colouration (in life). Dorsal and lateral sides of head black. Nuchal and dorsal region black, skin between scales and some of the intercalary granules, especially on neck und anterior dorsum, partly yellowish. Dorsal side of extremities black, with a tiny yellow dot at posterior end of scales (Fig. 5), yellow dots most prominent on hindlimbs. Dorsal side of tail black. Ventral side of head, neck, body, extremities, and tail anthrazite. The yellow colouration is only visible at a short distance, from a distance of 2 m or more, the animal looks uniform black (Fig. 6). Claws dark grey; eyes reddish brown; tongue pink.

Special anatomical features. *V. mabitang* possesses a large caecum, such as *V. olivaceus*. PNM 7272 contains ovarian follicles of a size between 5 and 7 mm, showing that it is mature.

Additional material. End of October 2000 a much larger specimen of *V. mabitang* was caught by Narciso Paulino in the same area as PNM 7272 in the South Pandan Forest. This specimen was brought to our field station at Sibaliw, NW-Panay Peninsula, for examination and picture taking, and released afterwards. Total length: 1750 mm; snout vent length: 640 mm; tail length: 1110 mm; weight: 5750 g; XII. 1.73; XVII. 70 (scale count taken from pictures); no enlarged supraoculars.

The overall appearance is very similar to PNM 7272, but the habitus is more massive, and the bulges above the temporal region much more pronounced (Fig. 7), with only a small longitudinal groove between both bulges on the parietal region. The colour is black, with only very faint, tiny yellow dots on scales of front feet, and no yellowish colouration on neck and back. Scales on head largest in parietal region. The body scales are very small, with the anterior nuchal scales smaller than the posterior head scales, and the posterior nuchals same size as smallest dorsals.

Etymology. The name mabitang is used for this species since generations within its range by the local people. The meaning is somewhat like big monitor lizard (in Kinarayan dialect). The name is used as invariable noun in apposition to the generic name.

Distribution. So far, *V. mabitang* is only known from forested areas of the NW-Panay Peninsula and the Western Panay Mountain Range. The area belongs to the West Visayan region, one of the well distinguished Philippine faunal regions (Heaney & Regalado 1998, de Jong & Treadaway 1993, Leviton 1963, and others), which are characterized by a high level of endemism. It just now starts to show that Panay is an endemism centre on its own within this region. Recent faunal investigations revealed several species new to science, which to present knowledge are endemic to Panay (e.g. Brown et al. 1997, Brown et al. 1999, Brown et al. in press, Ferner et al. 1997, Gaulke in press, Gonzales & Kennedy 1996). The closest relative of *V. mabitang, V. olivaceus*, is distributed over southeastern Luzon, Catanduanes and Polillo islands. The area belongs to another faunal region, the Luzon region.

The vertical distribution of *V. mabitang* within the Panay mountain range is still unknown. We know from sightings that it occurs at least up to a height of 450 m on the NW Panay peninsula. Generally we assume that its vertical distribution is restricted by similar factors as in *V. olivaceus*. This lizard occurs in heights up to about 400 m. Important temperature and moisture changes between 300 and 500 m are probably limiting many of the food plants of *V. olivaceus* to lower elevations, and therefore limit its upper distribution (Auffenberg 1988).

Habitat and life habits. To our present knowledge, *V. mabitang* is a highly arboreal, secretive lizard of the lowland rainforest.

Both specimens defecated seeds of the fruit of screw palms after capture. In captivity, different kinds of forest tree fruit and land snails were offered to PNM 7272. While it fed on the fruit of two species of screw palms (*Pandanus* spp.) and on the fruit of a fig tree *(Ficus minahassae)*, it showed no interest in the snails. Even when crawling directly in front of its snout, the sole reaction was short tongue flicking. According to N. Paulino, *V. mabitang* does not eat any carnivorous food, only fruit and leaves. He witnessed them eating fruit of different screw palms (*Pandanus* spp.), of a palm tree (*Pinanga* sp.), of a fig tree *(Ficus minahassae)*, and leaves from screw palms and a kind of shrub (local name is "topsi"). When opening the stomachs of some individuals previously, he found seeds and leaf remains.

These observations are surprising, because no exclusively vegetarian monitor lizard is known so far, and no monitor lizard feeding on leaves. To verify the observations, the stable isotope compositions of nitrogen of PNM 7272 was analysed for scaling its diet and trophic level (see Schoeninger et al. 1997 for methodology). We analysed fruit and leaves of screw palms, fruit of fig trees, and also claw material, different soft tissues, and contents of the gastrointestinal tract . The plants range at –0.1 to 1‰ δ^{15}N, and the biomass of PNM 7272 is shifted by around 1.5-3.1‰ δ^{15}N. This coincides with only

Fig. 4. *V. mabitang*, see the long fingers and claws.

Fig. 5. *V. mabitang* (PNM 7272), showing the yellow dots on posterior scale edges on neck and forelimbs.



Fig. 6. *V. mabitang* looks uniformly black when seen from some distance.

one single step in a food chain (Fry 1988). The food ingested by this lizard has to be expected at near 0-1‰ $\delta^{15}N$. Significant amounts of carnivorous diets can be excluded, because this should shift the nitrogen isotope composition towards values near or above 6‰ $\delta^{15}N$. A publication of the nitrogen isotopic composition of *V. mabitang* (near 3‰ $\delta^{15}N$) and *V. olivaceus* (near 9‰ $\delta^{15}N$) is in preparation at the GeoBio-Center Munich.

The exclusively vegetarian diet is one of the most unusual features of PNM 7272. So far, *V. olivaceus* was the only known varanid with frugivorous feeding habits. Auffenberg (1988) proposed for *V. olivaceus* an evolutionary dietary shift from insectivory or faunivory to frugivory, which neccesitated special adaptations in its gastrointestinal tract like the large caecum. So far *V. olivaceus* did not complete this evolutionary shift, it is a molluscivorous-frugivorous animal, with both food components being of equal importance for its nutrition. As main reason for its still partially faunivorous diet, Auffenberg (1988) mentioned that fruit is an adequate source of carbohydrate, but is generally inadequate in

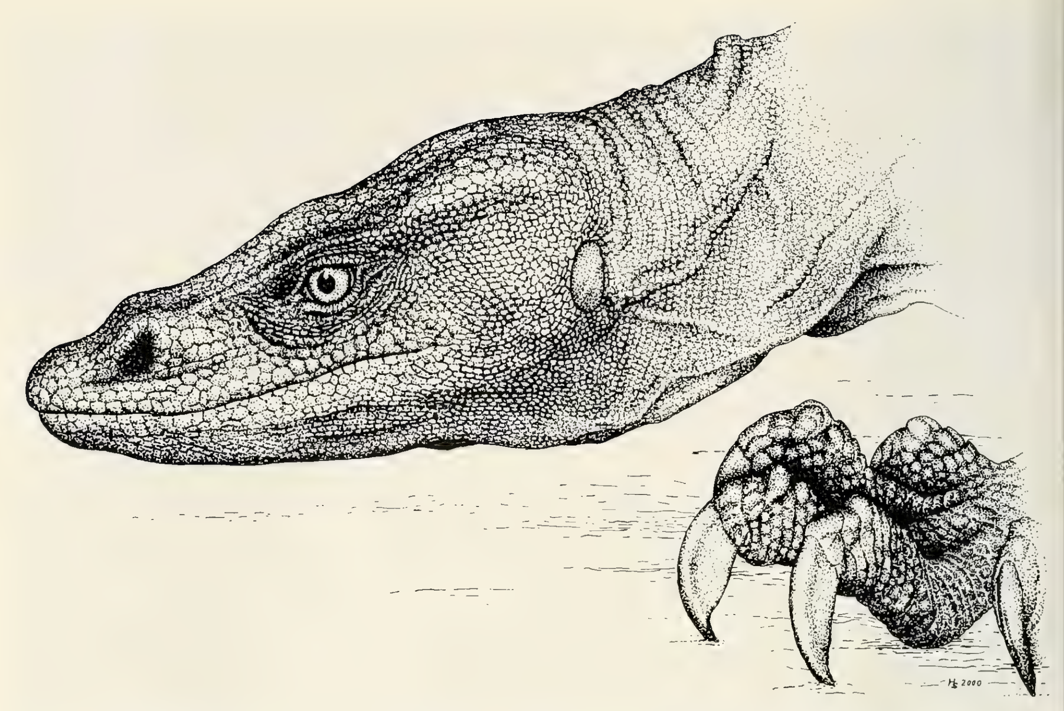


Fig. 7. Profile and hand of the first caught, large *V. mabitang* (175 cm), drawing by Helga Schulze.

protein. By feeding on land snails, in much less important percentages also on other animals like insects, arachnids, and vertebrates, *V. olivaceus* compensates this lack in protein, and at the same time adds calcium to its diet. Auffenberg (1988) refuted that *V. olivaceus* ever feeds on leaves as stated by some of the local inhabitants. While dissecting more than 100 specimens he never found evidence of leaves, nor did they take leaves in captivity or were observed feeding on leaves in the wild by any of the project members.

From the isotopic measures we conclude that PNM 7272 is unique among all other varanids. The nitrogen isotope measures inevitably fit with the herbivorous diets discussed. The general appearance of PNM 7272, the well developed ovarian follicles, and the well developed fat bodies give no indication that this specimen was suffering from malnourishment. Nitrogen isotope analyses of claw material and muscle tissue of the folivorous-frugivorous sailfin lizard *(Hydrosaurus pustulatus)* from the same habitat range at 1.5 to 1.9‰ δ^{15}N, and this is nearly identical to the δ^{15}N level observed in *V. mabitang*. For the mabitang one may presume a continuous evolutionary line, shifting from a mixed faunivorous-frugivorous diet to a frugivorous-folivorous diet.

So far, we have data for one animal only. Future investigations will show whether the trend towards an exclusively vegetarian diet has been reached in *V. mabitang* in general.

Both animals behaved very timid after capture. They never tried to defend themselves or showed any sign of threatening behaviour typical for monitor lizards, like tail coiling and uncoiling, gular extension, or hissing. Being held, they let extremities, tail, and head hang down. Most remarkable were the extended periods of time, which both animals spend in complete tanatosis (no movement could be observed for two consecutive days in PNM 7272). Letisimulation was never observed in *V. olivaceus* by Auffenberg (1988), but is described for *V. exanthematicus*, an African monitor lizard, by Barbour (1926). According to N. Paulino, feigning death is a common behaviour of the mabitang after capture.

Systematic relationships. *V. mabitang* is closely related to *V. olivaceus*, whose phylogenetic relations to other varanids still is subject to discussion, in spite of all studies done on the latter (e.g. Auffenberg 1976, 1978, 1979a, 1979b, 1988). In 1962 the monotypic subgenus *Philippinosaurus* was erected for *V. grayi* (now *V. olivaceus*) by Mertens, based on different skull features and the dentition. Auffenberg

(1976) accepted the subgenus *Philippinosaurus* in his redescription of *V. grayi*, but later on (Auffenberg 1988) classified this species among the "slit-nosed" monitors, and as being closest to *V. bengalensis*, a member of the subgenus *Empagusia*. In a pers. comm. (cited in Böhme 1991) he later on stated that a relation to *V. salvator* is also feasible. Based on the investigation of its hemipenial morphology, Böhme (1991) supported the idea of a rather isolated position (see also Ziegler & Böhme 1997). Based on the investigation of DNA sequences, Fuller et al. (1998) place *V. olivaceus* in close relationship to *V. prasinus*, a much smaller, arboreal monitor lizard from New Guinea, which was classified within the Australian subgenus *Odatria* by Mertens (1942), but according to its hemipenial morphology belongs in the Asian subgenus *Euprepiosaurus* (Böhme 1988). From this short overview, it is obvious that we still are far from a satisfying resolution of the phylogenetic relationship of *V. olivaceus*, and therefore also of its close relative *V. mabitang*. The results depend highly on the method used.

Acknowledgements

The work of the Philippine Endemic Species Conservation Project of the Frankfurt Zoological Society is formalized under the aegis of a Memorandum of Agreement with the Department of Environment and Natural Resources (Quezon City, Philippines), and the help of the Protected Areas and Wildlife Bureau (Director R.C. Bayabos: Collecting Gratuitous Permit No. 93) and RED J. Amador (DENR Region VI) is gratefully acknowledged. The project is sponsored by the Zoological Society Frankfurt, further by the ABC (Advocates of Bird Conservation), AZ, B. Bacsal, Daimler-Chrysler Foundation, A. de Dios, Prof. Dr. Dr. mult. h. c. E. Mayr, Pentax, H. Kessler v. Sprengeisen, Swiss Society for Bird Protection, and Vitakraft-Werke. Furthermore, M. Gaulke is indebted to the Zoological Society Frankfurt for the funding of a first distributional survey on *V. mabitang*. Many project members and people from the NW Panay area have part in the discovery of the new monitor lizard, and/or in the investigation of the first, later on released animal. Foremost Mr. Narciso "Narsing" Paulino should be mentioned, to whom we owe most of the information on the biology of this lizard, and who caught both specimens. We acknowledge gratefully the help of Fel C. Cadiz, Arnold Demegillo, Tai Felimon, Eric Garrett, Lucia Lastimoza, Stefan Luft, Enrique Sanchez, Benjamin "June" Tacud, Henry Urbina, and Vicente "Manong Viseng" Hironimo, who in 1996 gave the first hints to the existence of the animal. Hans-Georg Horn helped E. Curio in putting together all topically relevant monitor lizard information for a manual on the "mystery lizard" reinforcing the research. We are grateful to Mr. Nilo Subong, CENRO Kalibo, who took interested part in our investigations in the Philippines during all stages, and gave us the permit to preserve the holotype.

Thanks are due also to Wolfgang Böhme, ZFMK, Frank Glaw, ZSM, and to Rogelio Sison, PNM, for the loan of specimens and/or the permission to examine specimens under their care. The x-ray was done by Marianne Müller in the ZSM. Ulrich Struck and Alexander Altenbach, GeoBio-Center Munich, suggested and conducted all isotope analyses in the laboratory of the Bavarian State Collection for Paleontology and Geology. Finally we wish to thank Wolfgang Böhme, who critically revised the manuscript.

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Buchbesprechungen

37. Mebs, D.: Gifttiere – Ein Handbuch für Biologen, Toxikologen, Ärzte und Apotheker. – Wissenschaftliche Verlagsgesellschaft GmbH, Stuttgart, 2000, 350 S., 2. neu bearbeitete Auflage mit 320 meist vierfarbigen Abb. ISBN 3-8047-1639-3.

Nach dem Erscheinen der ersten Auflage dieses Buches, das allgemein großes Interesse fand, hat sich das Heer der "Gifttiere" erweitert. So wurden vom Autor bis dahin unbekannte oder unbeachtete Tiergruppen, wie Giftvögel oder unter den Säugetieren die ursprünglichen Insektenfresser, ebenso neu aufgenommen, wie die Vergiftungserscheinungen durch den Verzehr von Haifleisch, besonders deren Leber. Letztere Vergiftungen stehen der vielfach als Fischvergiftung bezeichneten Ciguatera sehr nahe, die durch mikroskopisch kleine, einzellige Geißeltierchen (Dinoflagellaten) hervorgerufen wird. Unter den passiven Vergiftungen, die durch den Verzehr von Meerestieren hervorgerufen werden (z.B. Muschelvergiftungen) spielen die Toxine dieser winzigen Meeresbewohner eine herausragende Rolle. Außerdem werden in dem durch zahlreiche charakterisierende Farbabbildungen der entsprechenden Gifttiere sehr anschaulichen Buch die aktiven Giftwirkungen der Meeres- und Landtiere vorgestellt. Dabei wird jede Tiergruppe, von den Schwämmen bis zu den Giftschlangen, ausführlich behandelt, wobei jedoch einschränkend hinzugefügt werden muß, daß nicht jedes der Tiere besonders erwähnt werden kann. Neben der Kurzcharakteristik der Merkmale, der Verbreitung und des Lebensraumes bzw. der Lebensweise der Einzelarten wird die Tiergruppe als Einheit vorgestellt. Ebenso werden die Vergiftungsumstände selbst, die Vorsichtsmaßnahmen, der Giftapparat, der Vergiftungsverlauf und die möglichen Erste-Hilfe-Maßnahmen beschrieben. Diesen vielfach fachlich medizinischen Dokumentationen werden oft Fallbeispiele beigegeben, in denen sowohl überlebte wie auch tödlich verlaufende Vergiftungen detailliert beschrieben werden. Jedem der Tiergruppenkapitel ist ein umfangreiches Literaturverzeichnis angehängt. Eine Zusammenfassung der 'Grundlagen und Hinweise' wird der Zusammenschau der Tiergruppen vorangestellt, in der die Gifttiere allgemein beschrieben werden, ebenso wie die Toxine, die Bedeutung dieser für die Pharmazie. Besonders eindrücklich sind die Beschreibungen, wie es zum Kontakt mit Gifttieren kommt, und die Ratgeber zu Maßnahmen bei einer Vergiftung. Auf drastische Abbildungen von Körperreaktionen auf Biß- oder Stichverletzungen wurde verzichtet. Viele altertümliche und traditionelle Behandlungsmaßnahmen, wie etwa das Aufschneiden von Schlangenbissen oder das Aussaugen der Bißwunden, werden kritisch unter die Lupe genommen. Dieses sehr informative Buch mit seiner Bebilderung spricht die im Titel aufgeführte Interessentengruppe sicher besonders an.

E. G. Burmeister

38. Sternberg, K. & R. Buchwald (Hrsg.): Die Libellen Baden-Württembergs; Band 1: Allgemeiner Teil, Kleinlibellen (Zygoptera). – Eugen Ulmer Verlag Stuttgart, 1999, 712 S., 241 Farbfotos, 49 Diagramme und Zeichnungen, 29 Verbreitungskarten und 21 Tab. ISBN 3-8001-3514-0.

Libellen gehören neben Schmetterlingen und Käfern zu den auffälligsten auch allgemein bekannten Insekten, die auf Grund ihrer geringen Artenzahl in Deutschland auch wissenschaftlich besonders gut bearbeitet sind. Diesem Umstand verdankt das vorliegende Buch seine herausragende Dokumentationsweise. In einzigartiger Weise haben die beiden Herausgeber, vorzügliche Kenner der europäischen Libellenfauna, mit zahlreichen Kollegen alles bisher Bekannte zu dieser Insektengruppe zusammengetragen und ein Standardwerk geschaffen, das nicht nur den Raum Baden-Württemberg erfaßt, sondern allgemein die Biologie, Faunistik und Ökologie dieser faszinierenden Fluginsekten mit ihren bizarren aquatischen Larven präsentiert. Neben den verschiedensten Aspekten, die auch die Namensgebung, die Systematik und Evolution und das Verhältnis Libelle – Mensch beleuchten, werden die 26 Kleinlibellenarten der insgesamt 75 Arten der Fauna Baden-Württembergs vorgestellt. Diese artlichen Dokumentationen enthalten neben den Verbreitungsangaben die Phänologie, Lebensraumansprüche, Larval- und Imaginalhabitate sowie die Biologie der beiden Stadien, Parasiten und, was besonders wichtig erscheint, die Einnischungsstrategien der nächstverwandten Arten. Diese Kapitel zu den einzelnen Arten schließen Anmerkungen zur Gefährdung und zum Schutz ein, wobei auch die Pflege und der Schutz der Lebensräume besonders Erwähnung finden. Bei der Darstellung der Verbreitung ist die ausschließliche Verwendung der Rasterpunktkarten antiquiert, da sie keine Aussagen zur lokalen Verbreitungsmustern zulassen. Hier scheint die Erfassung der bayerischen Libellen einen besseren Weg gegangen zu sein. Dennoch zeugt dieses Buch vom umfangreichen Wissen der Bearbeiter, das auch im Text umgesetzt wurde. Auf Grund fehlgeleiteter Naturschutzaktivitäten scheint der zweite Band, der die Großlibellen (Anisoptera) dokumentieren sollte, in Frage zu stehen, was ganz besonders bedauerlich wäre, zumal das Bundesland Baden-Württemberg sich durch die Unterstützung dieser besonders gelungenen Reihe zur Fauna auszeichnete.

E.-G. Burmeister

39. Thenius, E.: Lebende Fossilien – Oldtimer der Tier und Pflanzenwelt, Zeugen der Vorzeit. – Verlag Dr. Friedrich Pfeil, 2000, 228 S. ISBN 3-931516-70-9.

Heute lebende Organismen, die aus einer fernen Zeit zu kommen scheinen und auch in täuschend ähnlicher Form als Fossilien heute auf Steinplatten freipräpariert zu bestaunen sind, haben in allen Zeiten nicht nur Wissenschaftler fasziniert, sondern auch das Interesse eines breiten Publikums geweckt und die Phantasie angeregt. Wie konnten sich über Jahrmillionen gegenüber einer sich beständig ändernden Umwelt diese Formen erhalten? Hatten sie eine sogenannte Nische gefunden, in der sie sich behaupten konnten im Gegensatz zu ihren nächsten Verwandten? Sicher sind diese Pflanzen und Tiere meist sehr selten und nur auf kleine Regionen beschränkt, aber ihr Überleben dokumentiert eine erfolgreiche Strategie, über die vielfach noch sehr wenig bekannt ist. Meist sind sie selten, sieht man etwa vom Spinnentier "Pfeilschwanzkrebs" *Limulus polyphemus* ab, der kaum verändert im Vergleich zum *Mesolimulus walchi* der Solnhofener Plattenkalke erscheint, und auch heute noch zur Laichzeit an der nordamerikanischen Ostküste in großer Zahl zusammengeschaufelt und als Hühnerzusatzfutter verwendet wird. Der aus China stammende Ginkgo-Baum wird inzwischen in Fußgängerzonen der Städte betonumsäumt gepflanzt. Schicksal Lebender Fossilien? Sicher Ausnahmen, denn wir betrachten mit Erfurcht die Zeugen der Vergangenheit.

Das vorliegende Buch des bekannten Palaeontologen Erich Thenius vermindert nicht diese Ehrfurcht, macht aber die zahlreichen behandelten Organismen zugänglich, d.h. ihr Werdegang in der Stammesgeschichte wird beleuchtet und anhand anschaulicher Grafiken präsentiert. Nach einer Begriffsbestimmung "Lebender Fossilien", die nicht einheitlich ausfallen kann, werden von den Archaebakterien bis zu den Säugetieren Vertreter vorgestellt, die als Zeitzeugen fungieren, aber auch solche, die als einzige Überlebende einer großen Gruppe noch existieren, aber stark abgeleitet sind. Hier stößt der Begriff "Lebendes Fossil" an seine Grenzen. Die abschließende Übersicht zum System der Organismen mit den behandelten Aspiranten für den Titel Lebendes Fossil, aber auch mit ausgestorbenen Vertretern, erleichtert die Zuordnung. Das umfangreiche Literaturverzeichnis ist vorzüglich geeignet, die Erfahrung mit diesen außergewöhnlichen Objekten der Botanik wie Zoologie fortzusetzen. Neben dem Autor gilt auch dem Verlag besonderer Dank für diese Zusammenfassung, die nicht nur Wissenschaftlern der Biologie und Palaeontologie, sondern auch einer breiten interessierten Öffentlichkeit einen Einblick in die Vielfalt des Lebens und Überlebens eröffnet.

E.-G. Burmeister

40. Gorissen, I.: Die großen Hochmoore und Heidelandschaften in Mitteleuropa – Natur – Landschaft – Naturschutz. – Selbstverlag Igmar Gorissen, Siegburg, 1998, 190 S., 141 Abb., 7 Tab. ISBN 3-00-003890-6.

Natürliche offene Landschaften wie Hochmoore und Heiden sind inzwischen sehr selten geworden und verdienen besonderen Schutz. Die in diesem Buch beschriebenen 79 Areale des mitteleuropäischen Raumes, der den verschiedenen biogeographischen Einflußzonen von borealen bis zu mediterranen Elementen unterliegt, umfassen vielfach Großlebensräume, die besonders gefährdet sind. Ein großer Teil dieser Gebiete war durch militärische Nutzungen "geschützt", deren Wegfall sich nachhaltig in Flora und Fauna wiederspiegelt. Der Autor hat von Belgien bis Ostpolen Informationen zusammengetragen und zu jedem der Gebiete eine Strukturanalyse, die Bedeutung für die Vogelwelt im europäischen Rahmen, die jeweilige Größe, die Entwicklung und Nutzung sowie die Probleme des Gebietes zusammengetragen.

Einige der Moore und Heideflächen hätten vermutlich eine detailliertere floristisch und faunistische Behandlung verdient, zumal hierzu eine Fülle von Literatur vorliegt, die jedoch nicht berücksichtigt wurde. Bedauerlicherweise werden auch einige Arten angegeben, ohne zu prüfen, ob es sich dabei um Invasionisten oder um Besiedler von Rückzugsarealen handelt. Neben den Gebietscharakteristiken werden auch Areale außerhalb Mitteleuropas, wie in der Ukraine, in ihrer Bedeutung vorgestellt. Insgesamt ist diese Zusammenstellung eine Informationsquelle für Landschaftspfleger, wobei hier deutlich wird, daß diese Lebensräume Unikate sind und nach einer Degradierung unwiederbringlich verloren sind. Eine Ersatzlebensraumschaffung wird dadurch ad absurdum geführt. Darum sollten auch die im behördlichen Naturschutz tätigen Personen die in ihrem Zuständigkeitsbereich liegenden Moore und Heiden mit ihrer Sukzession, die in diesem Buch dokumentiert sind, ganz besonders im Auge behalten, was aber nicht zu einer Naturschutzkäseglocke über den Gebieten führen darf.

E.-G. Burmeister

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